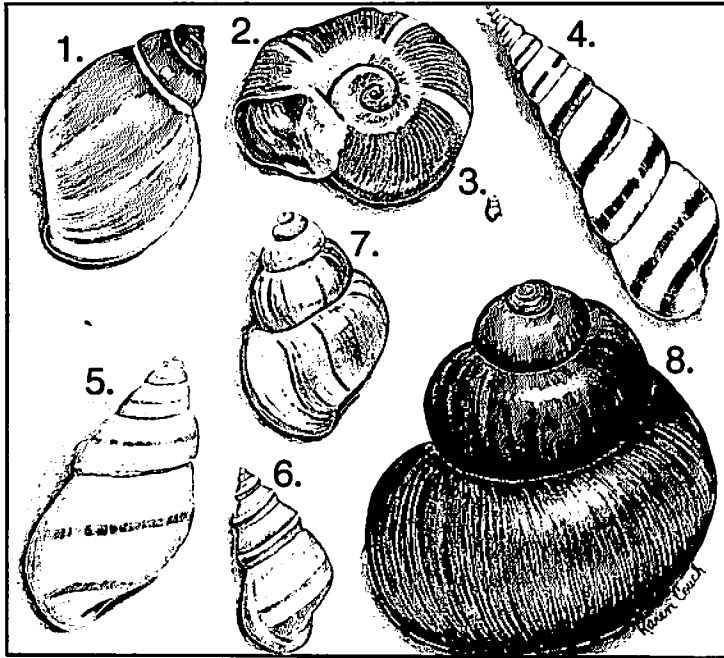


MISSOURI AQUATIC SNAILS



by: Shi-Kuei Wu Ronald D. Oesch Mark E. Gordon



All figures on cover are shown 3x.

1. *Physa goodrichi* Clench
2. *Helisoma trivolvis* (Say)
3. *Fontigens proserpina* (Hubricht)
4. *Pleurocera acuta* Rafinesque
5. *Elimia potosiensis* (Lea)
6. *Elimia potosiensis* (Lea)
7. *Lioplax sulculosa* (Menke)
8. *Viviparus intertextus* (Say)

MISSOURI AQUATIC SNAILS

Natural History Series, No. 5

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MISSOURI AQUATIC SNAILS

Shi-Kuei Wu
Ronald D. Oesch
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INTRODUCTION

THE STUDY OF AQUATIC SNAILS in Missouri extends over a period of more than 150 years. Amateur conchologists conducted many investigations, which often consisted of only a compilation of species from highly localized collecting sites. During the 1800s, publications primarily were limited to the descriptions of a few "new" species collected incidentally at noncontiguous localities (e.g., Lea, 1841; Call, 1886a; Pilsbry, 1890). O. A. Crandall, of Sedalia, Missouri, initiated a revision of the *Physa*, but died shortly after the publication of his first manuscript (Crandall, 1901). F. A. Sampson, also from Sedalia, published several articles on snails from central and southern Missouri (e.g. Sampson, 1883, 1885) and the first state-wide faunal checklist to include aquatic snails (Sampson, 1913).

Foremost among the "amateur" investigators, however, is Leslie Hubricht, who has published numerous papers on distribution and systematics based on his voluminous collections of aquatic snails (e.g. Hubricht, 1938, 1940, 1941, 1942, 1950, 1971) and other mollusks. Subsequent studies have included faunal surveys, species descriptions, systematic revisions, ecology and physiology (e.g. Gardner, 1986; Gordon, 1980, 1986, 1987; Greenlee, 1974; Hershler, 1994; Hershler & Holsinger, 1990; Hershler & Hubricht, 1988; Hershler et al., 1990; Hershler & Thompson, 1992). As part of broader faunal and natural history studies, Lewis (1974) and Vineyard & Feder (1982) also noted collections of aquatic snails.

A DIVERSE ARRAY OF AQUATIC HABITATS occurs in Missouri (see Pflieger, 1989). South of the Missouri River, the principal geologic region is the Ozark Plateaus, with rocky highland stream habitats. Prairie streams drain the glacial tills north of the Missouri River and the Osage Plains west of the Ozarks. In extreme southeastern Missouri, lowland streams cross the northernmost portion of the Mississippi Alluvial Valley (or Delta) region. Excepting the Ozarks, the snail fauna in most of these regions is dominated by pulmonates. Prosobranch snails are most commonly encountered in the Ozarks, and several species are endemic to the region (e.g., *Elimia potosiensis*, *Leptoxis arkansensis*; see Gordon, 1986). A few of these species are found only in Missouri (e.g., *Somatogyrus rosewateri*), including some species re-

stricted to cave environments (e.g., *Amnicola stygia*, *Antrobia culveri* & *Fontigens proserpina*). Many streams in the prairie and delta regions have been channelized, and reservoirs have been constructed on some of those rivers and others in the Ozarks. The resulting habitat modifications from these activities have altered the faunal composition of many snail populations. In order to determine the number and distribution of aquatic snail species that inhabit Missouri, a state-wide survey was initiated by R.D. Oesch in 1982. Snails were collected by dip net, hand-picking from the substrate, and sorting of stream bottom aggregates. A placer gold suction dredge was used to recover specimens from the bottom of the Mississippi River. All snails collected were deposited in the Molluscan Collection, University of Colorado Museum (acronym UCM). Illustrations of shells were made with a *camera lucida* attached to a M-5 Wild microscope.

A TOTAL OF 56 SPECIES WAS RECORDED from Missouri. Determinations of pulmonate and operculate species were made by Shi-Kuei Wu and Mark E. Gordon, respectively. Identifications were based primarily on shell characters, but were supplemented by diagnostic anatomical characters for some groups. The *Physa* required dissection and comparison with holotypes from the Academy of Natural Sciences of Philadelphia (ANSP); University of Michigan, Museum of Zoology (UMMZ); U.S. National Museum of Natural History (USNM) to ensure accurate identification of species (see Wu & Beetle, 1996). In addition to the above museums, supplemental records were obtained from the Field Museum of Natural History, Chicago (FMNH) and the Florida Museum of Natural History, University of Florida (FSM) for species poorly represented in our collections or that may have been extirpated from Missouri.

Classification at the family level and above follows that of Burch (1989). A conservative classification of generic names was used with subgenera, in some instances, to denote systematic relationships of species with similar morphological characters. Diagnoses of family, genus and subgenus are based on shell characters (for morphological terminology, see pages 25-32 in Burch, 1989). Each species diagnosis is accompanied with shell figures, a list of occurrences by county with museum lot numbers, specific localities, distribution maps, common names, and pertinent remarks. Unless

otherwise noted by specific acronym, all museum lot numbers refer to the University of Colorado Museum. Common names followed Turgeon et al. (1988), Wu (1989), or were newly named in this publication.

A single dot on the distribution maps covers approximately 2.7 miles and may represent more than one collection site.

The somewhat cryptic statements given in the Records sections are the legal locality descriptions to the precise location from which a collection was made, and looks similar to this example — T54NR13W Sec 10 SE4NE4.

T = Township, and denotes its location in the state in a north-south direction, T22N is near the Arkansas line, T60N would be near the Iowa line

N = North, there are no townships in Missouri designated as South;

R = Range, and denotes the township location from an east-west perspective

W = West, there is a line in Missouri that divides townships into a western region and an eastern region
Sec = Section; a township is divided into 36 sections, a section equals one square mile, (may vary slightly in some cases); therefore, the number 10 is the tenth

section in the township;

SE4 indicates that the site is in the southeast quarter of Section 10, NE4 more closely defines the location; it says the site is in the northeast quarter of the southeast quarter.

In some descriptions Sec is replaced by Surv (Survey). These tracts of land were Spanish land grants and are found in eastern Missouri; they supersede the common Sec system used in the state today.

Other abbreviations following Sec or Surv may be interpreted this way:

N2 = North half of the section;

N2SE4 = the southeast quarter of the north half;

E2 = East half of the section;

C = Center of the section;

E2C = Center of the east half of the section.

Township & Range and section numbers appear on Missouri Highway & Transportation Department County maps & United States Geological Survey Topographic maps.

In a few instances, latitudinal and longitudinal coordinates are given.

This publication is a collaboration of the three authors — S-K. Wu, R.D. Oesch, and M.E. Gordon.

ACKNOWLEDGMENTS

This study was supported (in part) by a small grant from the Missouri Department of Conservation.

We thank the following MDC personnel for their assistance: Dr. Jim H. Wilson supervised the securing of the grant and gave his support and consultation on all aspects of this project; Dennis Figg identified collecting sites for state endangered species and donated personal collections; Leroy Koch dredged snails from the bottom of the Mississippi River.

Paul Nelson, Division of Parks, Recreation and Historic Preservation of the Missouri Department of Natural Resources, provided authorization to collect in the State Parks. Art Sullivan, National Park Service, authorized collecting within the Ozark National Scenic Rivers Monument.

Mrs. Frieda Schilling kindly donated shells of *Cincinnatia integra* and *Fontigens proserpina* from her extensive collection of Missouri Mollusca (now housed in the Field Museum of Natural History, Chicago). Shells from her collection were also used for the cover.

We would also thank the following people: Dr. Kenneth Boss, Museum of Comparative Zoology,

Harvard University, for access to *Physa* holotypes; Dr. John B. Burch for access to collections, holotypes, loan of specimens and the reading of the manuscript on the Physidae; Dr. Robert Hershler, National Museum of Natural History of the Smithsonian Institution, for access to collections of *Physa* holotypes and specimens of *Fontigens proserpina*; Dr. Gary Rosenberg, Academy of Natural Sciences of Philadelphia, for access to *Physa* holotypes; Dr. Rüdiger Bieler, Field Museum of Natural History of Chicago, for loan of specimens of *Antrobia culveri* from the Leslie Hubricht collection; Dr. Fred Thompson, Florida Museum of Natural History, University of Florida, for information on *Pyrgulopsis scalariformis*; Wendell Pennington, Cookeville, Tenn., Donna Beal, Overland, Mo., and John and Dorothy Stadel, Ferguson, Mo., for assisting in preparing and proof reading the manuscript.

Thanks also to Dr. Mick Sutton who collected snails in caves in the Irish Wilderness and adjacent areas in Missouri, and to Dr. Stan Sides, Gregory "Tex" Yocum, David Oesch, Andrew Benedictus & Bill Reeves, who provided invaluable assistance in snail collecting in the caves of Perry County.

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CLASS: GASTROPODA

SUBCLASS: PROSOBRANCHIA

ORDER: MESOGASTROPODA

FAMILY: VIVIPARIDAE GRAY 1847

Shell medium to large, relatively thin to heavy, turbinate, spire usually elevated, typically dextral, inflated, whorls flatly to roundly convex, surface usually smooth, imperforate to minutely umbilicate; aperture ovate to subcircular, outer lip simple; operculum horny, nucleus subcentral, growth lines generally concentric, nucleus paucispiral in *Lioplax* only.

GENUS *CAMPELOMA* RAFINESQUE 1819

Genus characters:

Shell of moderate to pronounced thickness, rarely sinistral, conical, imperforate, surface smooth except for lines of growth, sutures impressed, whorls rather rounded; aperture ovate, inner lip more or less sinuous.

Clench (1962) noted a lack of distinctive morphological characters within *Campeloma* upon which the bases of specific differentiations could be made. Such a lack of consistent phenotypic variation may mask evolutionary trends (Gordon, 1986). With respect to this problem, Clarke (1973) alluded to the possibility of *Campeloma* representing an assemblage of cryptic species. Karlin et al. (1980) also noted that variation in reproduction by species of *Campeloma* was not necessarily consistent within species. Pending a definitive revision of the genus, identification of species of *Campeloma* in this section should be considered tentative.

Campeloma missouriensis Gordon, *nomen novum*

Common name: Missouri campeloma

Figure 1

Diagnostic characters:

Shell large (up to 28.6mm in length and 17.4mm in width), heavy, spire subconical and relatively tall; color olivaceous to dark brownish-green; aperture subovate, pointed apically, less than half the shell length, parietal-columellar lip straight to weakly curved with a relatively thick callus, upper half of outer lip straight.

Type specimen and type locality:

UCM 37079, from the Mississippi River at Louisiana, Pike County, Missouri, T54NR01W Sec 12 NE4, is designated the holotype.

Etymology:

This species is named after the state of Missouri.

General Distribution:

This species appears to inhabit the upper Mississippi River and lower Missouri River basins with the exception of drainages of the north slope of the Ozark Plateaus (see Baker, 1928: as *Campeloma integrum*).

Distribution in Missouri:

Presently known from the Mississippi River upstream from St. Louis and Missouri River basin in the Prairie Region (Map 1).

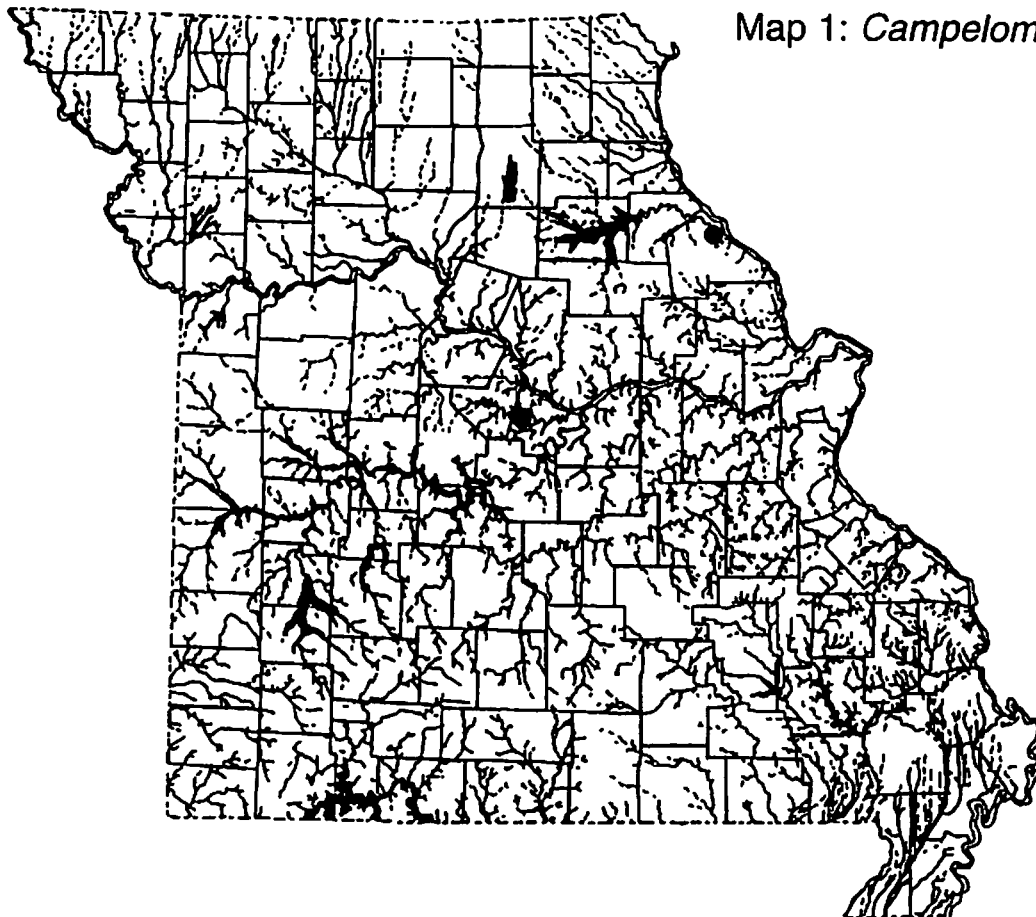
Records:

COLE COUNTY: 36002-NORTH MOREAU RIVER, T44NR14W Sec 12 SE4; **PIKE COUNTY:** 37079 (holotype) -MISSISSIPPI RIVER, T54NR01W Sec 12 NE4.

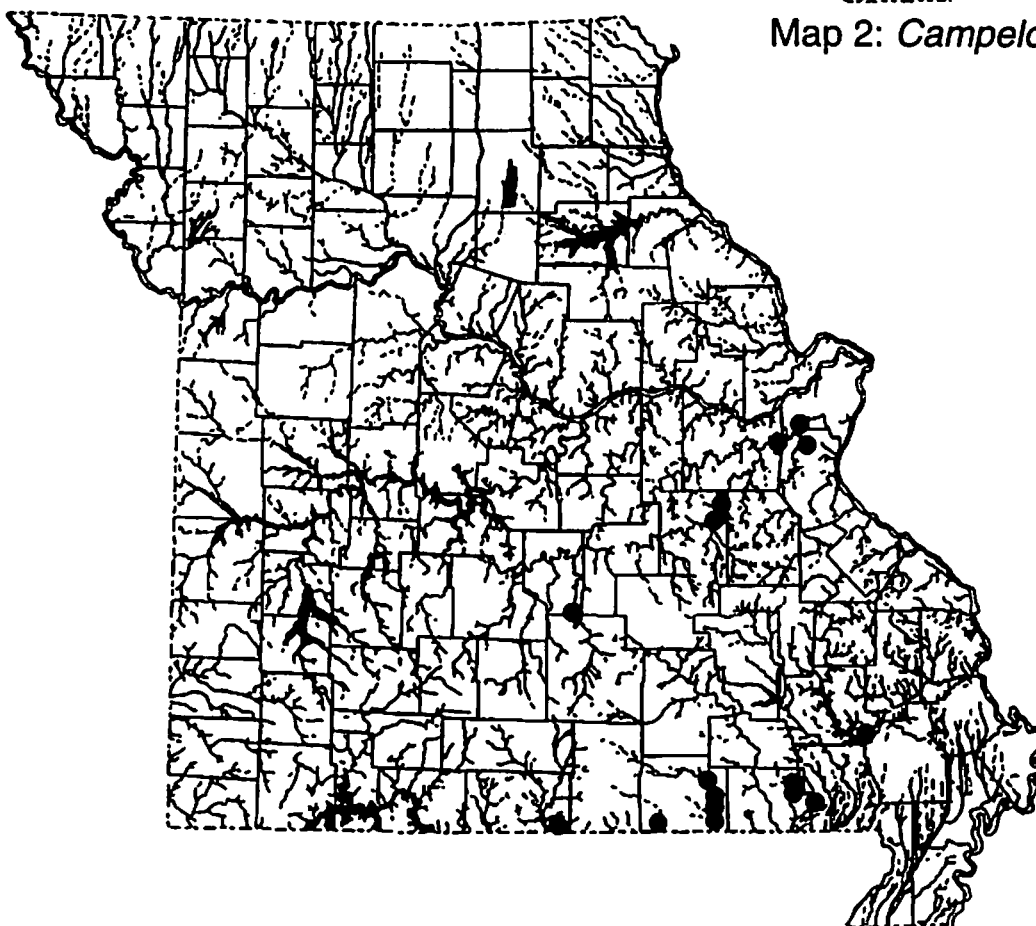
Remarks:

This snail was long considered to be the same species as *Paludina integra* Say, 1821; however, the recent designation of a neotype for that taxon by Hershler & Thompson (1996) invalidates its usage for this species of *Campeloma* (see Remarks under *Cincinnatia integra*). A review of Call (1886a), Baker (1928), and Clench (1962) indicates that no other subsequently described taxon is available in the synonymy as a replacement for *Campeloma integrum* (*sensu* Haldeman, 1840, *non* Say, 1821, *fide* Hershler & Thompson, 1996). As such, *Campeloma missouriensis* is proposed as a *nomen novum* for the species formerly known as *C. integrum*. Missouri specimens of this snail on occasion have been identified as *Campeloma decisum* (Say 1817). As *C. integrum*, it was listed by Burch (1989) as a junior synonym of *C. decisum*. Previously, Clarke (1973) only tentatively had considered these two species to be possible synonyms, and Call (1886a), Baker (1928) and Clench (1962) had listed them as distinct species. Jokinen (1992) noted differences in life history characteristics between *C. decisum* in northeastern North America and nominal populations from Louisiana, indicative of two distinct species. Contrasted

Map 1: *Campeloma missouriensis*
Gordon



Map 2: *Campeloma subsolidum*
(Anthony)



to *C. decisum*, specimens from Missouri are slightly smaller with somewhat flattened (as opposed to roundly convex) whorls, not as deeply impressed sutures, a spire half or more the length of the aperture, and a darker color. A more complete description and discussion of *C. missouriensis* is presented under *C. integrum* in Baker (1928). As noted by Baker (1928), *C. decisum* does not occur in Missouri.

***Campeloma subsolidum* (Anthony 1860)**

Common name: highland campeloma

Figure 2

Diagnostic characters:

Same as *Campeloma missouriensis* except shell is larger (up to 32.9mm in length and 20.7mm in width), somewhat stockier, whorls are more strongly shouldered, and spire appears relatively shorter; color light grayish-green to olivaceous, irregularly streaked with thin reddish to reddish-brown lines; aperture approximately half the shell length, parietal-columellar lip sigmoid with a light callus, outer lip regularly rounded.

Distribution in Missouri:

From the drainage systems of the Ozark Plateaus (Map 2).

Records:

BUTLER COUNTY: 35949-BEAVERDAM CREEK, T24NR04E Sec 02 SE4; **CRAWFORD COUNTY:** 33026-MERAMEC RIVER (MR), T39NR02W Sec 30 EC; 32291-(MR), T40NR02W Sec 25 C; 32549-(MR), T40NR02W Sec 24 C; **JEFFERSON COUNTY:** 31797, 34277 & 34283-(MR), T43NR04E Sec 05 EC; **OREGON COUNTY:** 34254 & 35943-ELEVEN POINT RIVER (EPR), T23NR02W Sec 34 SW4; 36146 & 36948-(EPR), T25NR03W Sec 31 NE4; 36956-(EPR), T24NR03W Sec 11 SE4; 36047-(EPR), T24NR02W Sec 32 SE4; 36966-(EPR), T24NR02W Sec 20; 36953-(EPR), T24NR03W Sec 02 SC; 36961-(EPR), T24NR02W Sec 18 C; 35866 & 36054-(EPR), T23NR02W Sec 17; 35873-(EPR), T23NR02W Sec 20 NE4C; 35876-(EPR), T23NR02W Sec 21; 35966-SPRING RIVER, T21NR05W Sec 05 SE4; **OZARK COUNTY:** 32271-BENNETT BAYOU, T21NR11W Sec 02 E2; **PULASKI COUNTY:** 32117-BIG PINEY RIVER, T34NR10W Sec 33 SW4; **RIPLEY COUNTY:** 34213-LITTLE BLACK RIVER, T24NR03E Sec 09/10; 35954-LITTLE BLACK RIVER, T24NR03E Sec 23 C; **ST. LOUIS COUNTY:** 32562-(MR), T44NR03E Sec 25 E2; 31834-(MR), T44NR04E Sec 19; **WAYNE COUNTY:** 32592, 34230 & 35919-STANLEY CREEK, T27NR08E Sec 18 W2.

Remarks:

Campeloma subsolidum most recently has been considered a junior synonym of *C. crassula* Rafinesque 1819 (Clench, 1962; Burch, 1989). *C. crassula* generally is distributed throughout portions of the Ohio River basin and recently has been collected from the lowland habitats of the Mississippi Alluvial Valley in Arkansas. The species of *Campeloma* present in the Ozark Plateaus tends to be smaller, has a relatively smaller aperture, and is gonochoristic in comparison to the parthenogenetic *C. crassula* collected in Arkansas. This species generally has been referred to as a form of *C. subsolidum* (Call, 1886b; Sampson, 1893, 1894, 1913; Leonard, 1959; Gordon, 1980, 1981, 1982), and that name is used here for consistency pending revision. *C. crassula* may have occurred historically in the lowland regions of extreme southeastern Missouri.

GENUS *LIOPLAX* TROSCHEL 1857

Genus characters:

Shell ovate, usually turreted, carina present on at least the earlier whorls, sutures usually deeply impressed, shell sculpted with microscopic spiral continuous or granular ridges, color generally light to dark olivaceous green; operculum nucleus growth lines initially paucispiral, later becoming concentric.

***Lioplax sulculosa* (Menke 1828)**

Common name: furrowed lioplax

Figure 3

Diagnostic characters:

Shell medium, (up to approximately 25mm), relatively thin, spire moderately tall, minutely umbilicate, early whorls carinate, later whorls rounded or subcarinate; aperture ovate, parietal-columellar lip with a light callus, outer lip regularly rounded.

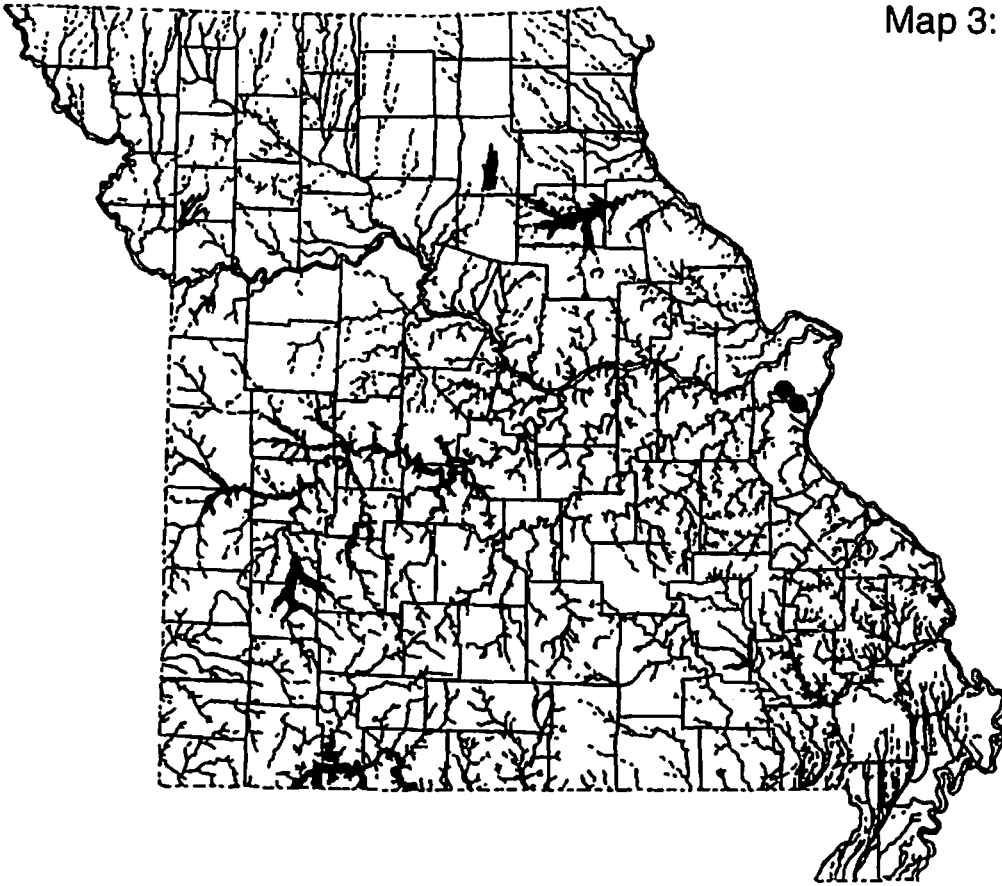
Distribution in Missouri:

The only records are from the Meramec River near St. Louis (Map 3).

Records:

ST. LOUIS COUNTY: (USNM) 106259-Meramec River @ Kirkwood; (UMMZ) 176513 & 176514-Meramec River 3 miles south of Maltese.

Map 3: *Lioplax sulculosa*
(Menke)



Remarks:

Apparently a species preferring larger rivers and more lowland type habitats.

GENUS *VIVIPARUS* DENYS de MONTFORT 1810

Genus characters:

Shell large, subconical, rather thin, yellowish-green or olivaceous to dark brownish-green, typically with brown to reddish bands, sutures deeply impressed; aperture ovate to subcircular, parietal margin may be slightly thickened, outer lip regularly rounded.

***Viviparus georgianus* (Lea 1834)**

Common name: banded mysterysnail

Figure 4

Diagnostic characters:

Shell up to 45mm, subglobose, relatively thin but not fragile, whorls strongly convex; color uniform or with up to 4 evenly spaced bands; parietal-columellar margin slightly sinuous.

Distribution in Missouri:

The only recently collected specimens were found in the Eleven Point River, Oregon County. (Map 4). Clench (1962) reported historic records from the Current River system in Shannon County.

Records:

OREGON COUNTY: 35872-ELEVEN POINT RIVER, T23NR02W Sec 20 NE4; 32141 & 36053-ELEVEN POINT RIVER, T23NR02W Sec 17 SE4.

Remarks:

A species typical of lowland river habitats. The very sandy substrate that occurs in portions of the Eleven Point and Current rivers apparently has allowed the incursion of this snail into the Ozarks. It is known only from the lowland portions of these rivers in Arkansas.

***Viviparus intertextus* (Say 1829)**

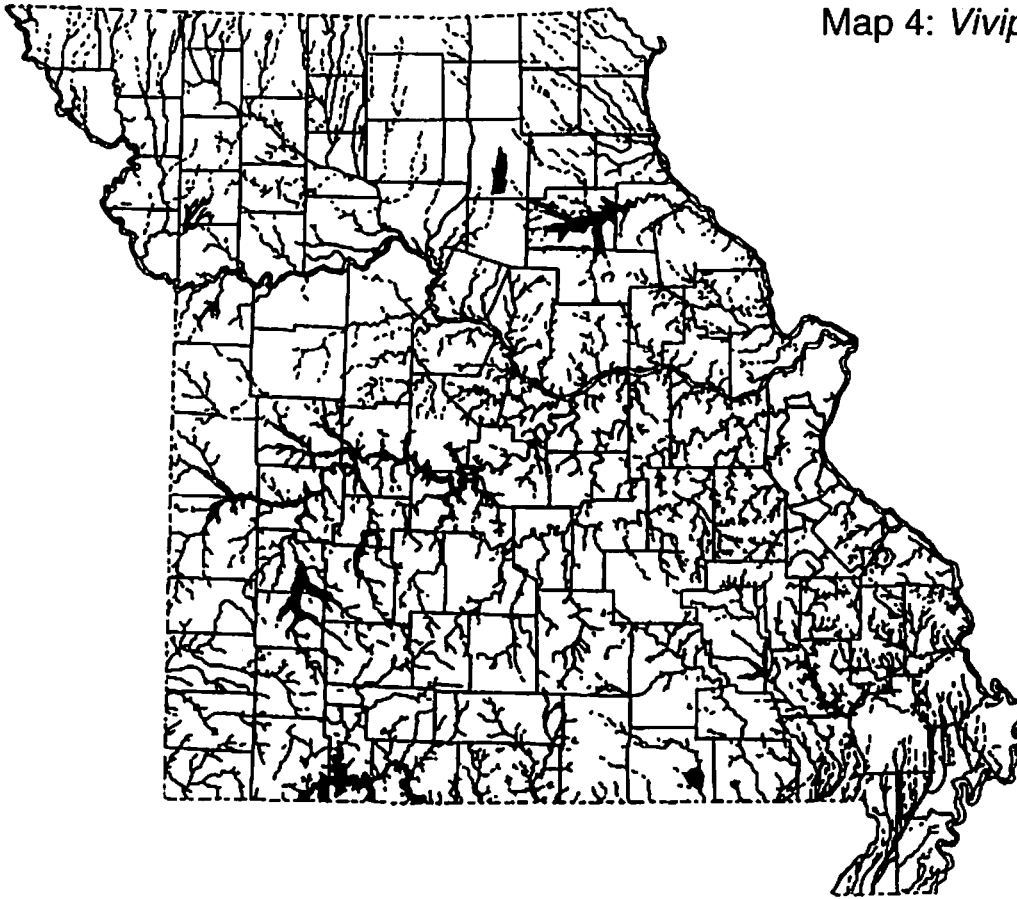
Common name: rotund mysterysnail

Figures 5-6

Diagnostic characters:

Shell up to 32mm, globose, thin, whorls strongly convex, spire usually short, surface sculpted with fine

Map 4: *Viviparus georgianus*
(Lea)



growth lines and minutely beaded spiral ridges sometimes producing a faint malleated appearance; color generally dark brownish-green, young shells may be yellowish-green and display up to 4 bands that almost invariably are obscured by the dark coloration in older snails; outer lip broadly rounded.

Distribution in Missouri:

Found in lowland streams in counties bordering the Mississippi River and in the St. Francis River drainage (Map 5).

Records:

LINCOLN COUNTY: 35832-B.K. LEACH WILDLIFE AREA, T50NR03E Surv 1693 NC; **MISSISSIPPI COUNTY:** 33748-ROADSIDE POOL ALONG MO Hwy 77, T25/26NR17E Sec 34 SW4; **PERRY COUNTY:** 37691-BEROME MOORE CAVE, T36NR10E Sec 02; 36460-RITTER CAVE, T36NR10E Surv 86; **PIKE COUNTY:** 36914 & 36917-DU PONT RESERVATION, T55NR02/03W Sec 07 NW4; 36901-TED SHANKS WILDLIFE AREA, T55NR02W Sec 28 SC; **STODDARD COUNTY:** 33720-MINGO NATIONAL WILDLIFE REFUGE (MNWR), T27NR09E Sec

19 NW4; 33003-(MNWR) BLUFF POOL BETWEEN FLATBANKS @ MUSEUM, 34149-(MNWR) POOLACROSS ROAD FROM ROCKHOUSE LAKE; 33724-ROADSIDE DITCH ALONG MO Hwy 51, T27NR09E Sec 08 NW4; 35797-ROADSIDE POOL ALONG MO Hwy 51, T27NR09E Sec 19 NW4.

Remarks:

Species of *Viviparus* typically prefer larger river habitats with fine particle substrates; however, *V. intertextus* often occurs in small streams with relatively strong currents and a gravel-cobble substrate.

Viviparus subpurpureus (Say 1829)

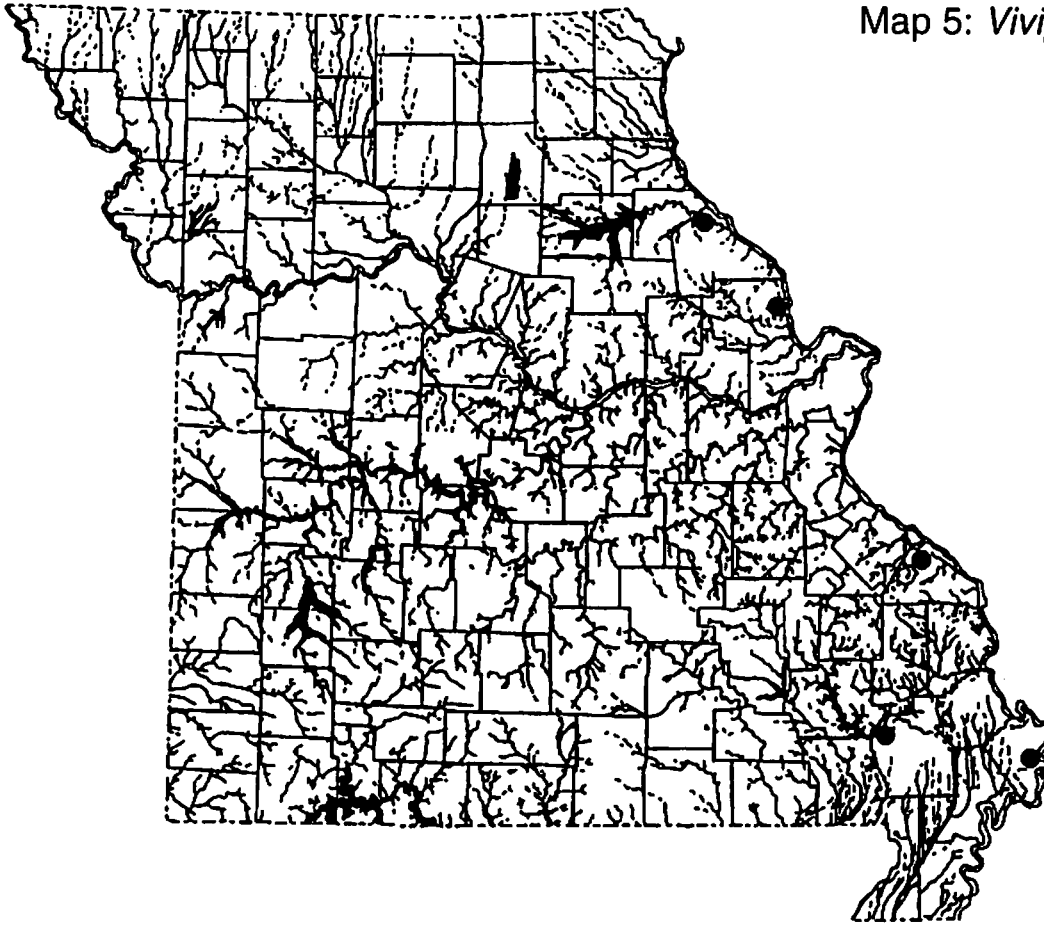
Common name: olive mysterysnail

Figures 7-8

Diagnostic characters:

Shell to about 33mm, subglobose to subconical, relatively tall and heavy, whorls convex but the upper half of the whorl tends to be flattened and slightly shouldered in larger shells, surface sculpture with fine growth lines and occasionally with fine spiral ridges and faint malleations; color uniform or with up to 3 generally

Map 5: *Viviparus intertextus*
(Say)



evenly spaced bands; aperture may be purplish within.

Distribution in Missouri:

This species has been reported from the Mississippi River, Meramec River, a tributary of the lower Black, and St. Francis rivers (Map 6).

Records:

BUTLER COUNTY: 35952-SLOUGH JUST E OF CANE CREEK ON U.S. Hwy 160, T24NR05E Sec 15 EC; **CRAWFORD COUNTY:** 36972-MERAMEC RIVER T37NR05W Sec 27 SE4; **DUNKLIN COUNTY:** 34160-ST. FRANCIS RIVER @ MO Hwy 53, T22NR08E Sec 03/10; **PIKE COUNTY:** 37078-MISSISSIPPI RIVER JUST N OF U.S. Hwy 54, T54NR01W Sec 12 NE4.

Remarks:

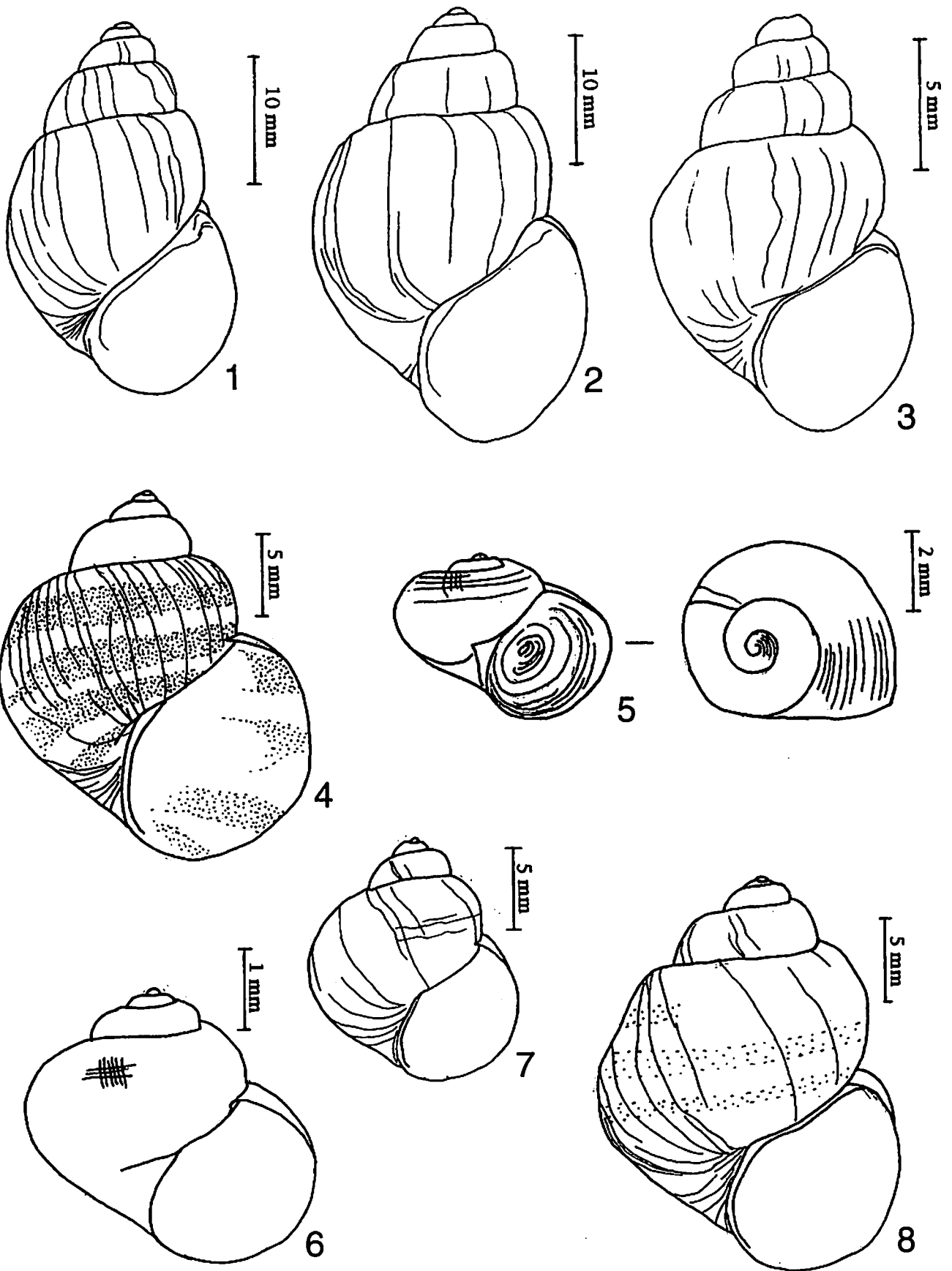
This species displays habitat preferences typical of most species of *Viviparus*. However, like *V. intertextus*, it also may be found in smaller streams and areas with swift flowing currents and gravel-cobble substrates. *Viviparus subpurpureus* resembles *V. georgianus* but may be distinguished by the latter's more convex whorls, the relatively larger appearing aperture, and the thinner shell.

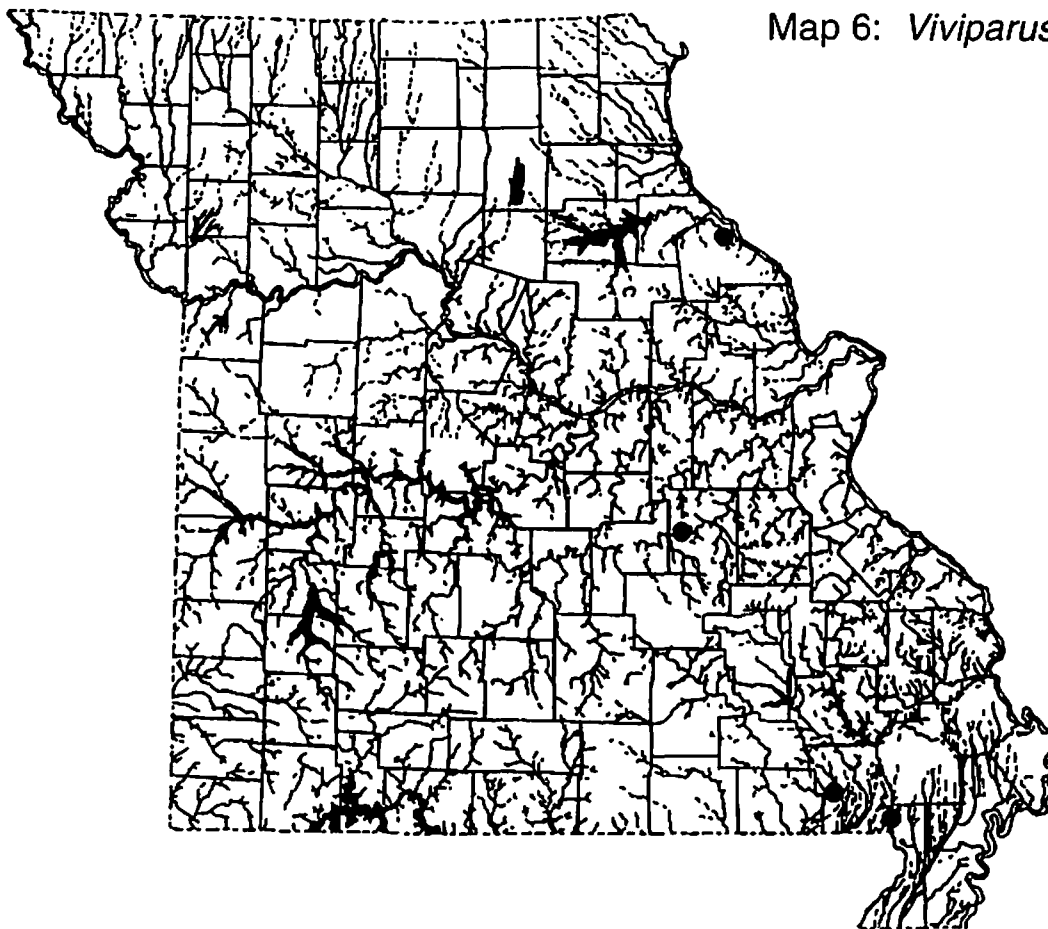
FAMILY HYDROBIIDAE TROSCHEL 1857

Family characters:

Shell minute to small, dextral, subglobose to conical, spire extremely depressed to elongate, sutures

Figs. 1-8. Shells of the Family Viviparidae. FIG. 1. *Campeloma missouriensis* Gordon: Apertural view. UCM 37079 (Holotype). Shell length 28.9mm, 6 1/8 whorls. FIG. 2. *Campeloma subsolidum* (Anthony): Apertural view. UCM 31834. Shell length 33.2mm, 6 1/2 whorls. FIG. 3. *Lioplax sulculosa* (Menke): Apertural view. UMMZ 176514 (apex broken). FIG. 4. *Viviparus georgianus* (Lea): Apertural view. UCM 36053. Shell length 22.2mm, 5 5/8 whorls. FIG. 5. *Viviparus intertextus* (Say): Apertural and apical views, UCM 33003. Shell length 4.3mm, 5 1/2 whorls. FIG. 6. *Viviparus intertextus* (Say): Apertural view. UCM 33003. Shell length 14mm, 5 1/4 whorls. FIG. 7. *Viviparus subpurpureus* (Say): Apertural view. UCM 37078. Shell length 14.6mm, 4 3/4 whorls. FIG. 8. *Viviparus subpurpureus* (Say). Apertural view. UCM 37078. Shell length 23.6mm, 5 3/8 whorls.





Map 6: *Viviparus subpurpureus*
(Say)

generally well impressed, imperforate to umbilicate, transparent to opaque, surface smooth to highly sculptured, color generally uniform; aperture subcircular, ovate or subrhomboidal, peristome generally continuous with outer lip simple and acute; operculum generally corneous, occasionally thickened or calcareous, usually paucispiral.

The Hydrobiidae is an extremely speciose group of snails and contributes more species to the aquatic fauna of Missouri than any other gastropod family. Hydrobiids have evolved to inhabit just about every available aquatic environment. In Missouri, the fauna includes species adapted to epigeal and troglodytic habitats, small spring runs to large rivers, and high energy riffles to calmer pool-like situations. In such a large family, species recognition has been difficult and generic affinities have been uncertain. There is considerable overlap among genera in shell morphological characters, and the most diagnostic features for genera differentiation are anatomical, particularly penial structure. The Hydrobiidae presently is being revised (e.g. Hershler, 1994; Hershler & Hubricht, 1988; Hershler & Thompson, 1992, 1996; Hershler et al. 1990; Thompson, 1989).

GENUS *AMNICOLA* GOULD & HALDEMAN 1840

Genus characters:

Shell 2-5mm high, depressed-conic to elongated, spire rather short and subacute, 4-6 rounded to slightly shouldered whorls, nuclear whorl large (0.38-0.48mm in diameter) and slightly elevated above the level of the second whorl, umbilicus narrow to widely open; aperture oval to roundly oval; operculum usually spirally and longitudinally striated.

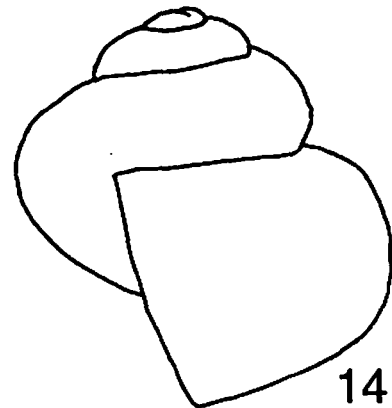
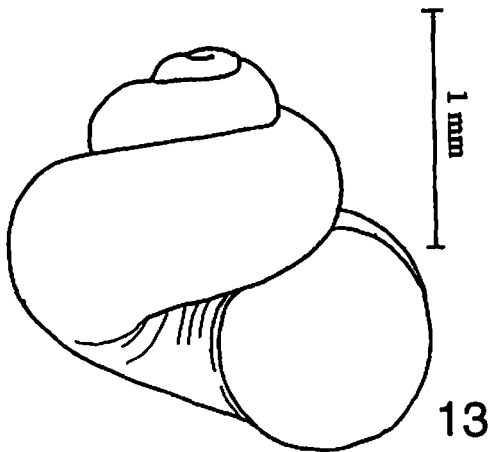
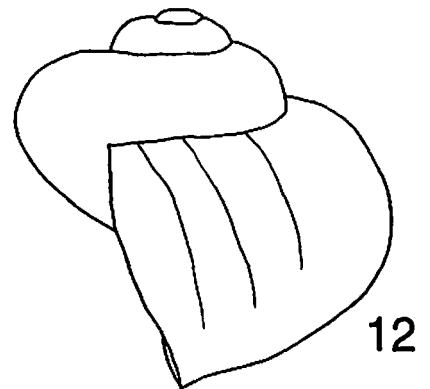
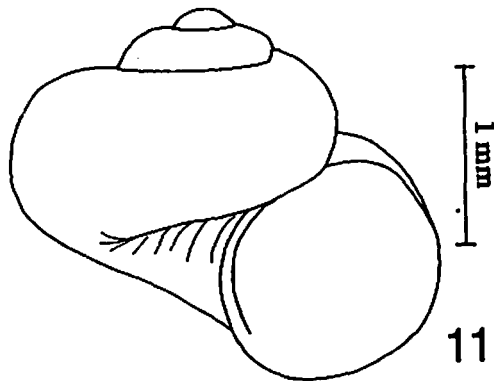
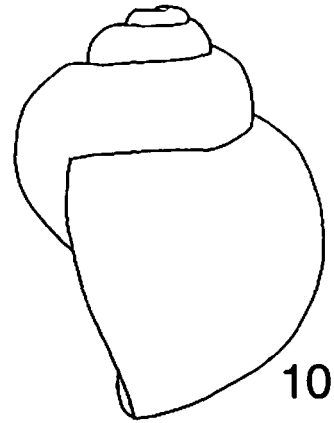
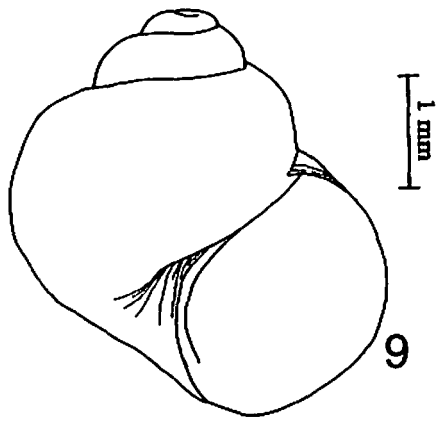
Amnicola limosa (Say 1817a)

Common name: mud amnicola

Figures 9-10

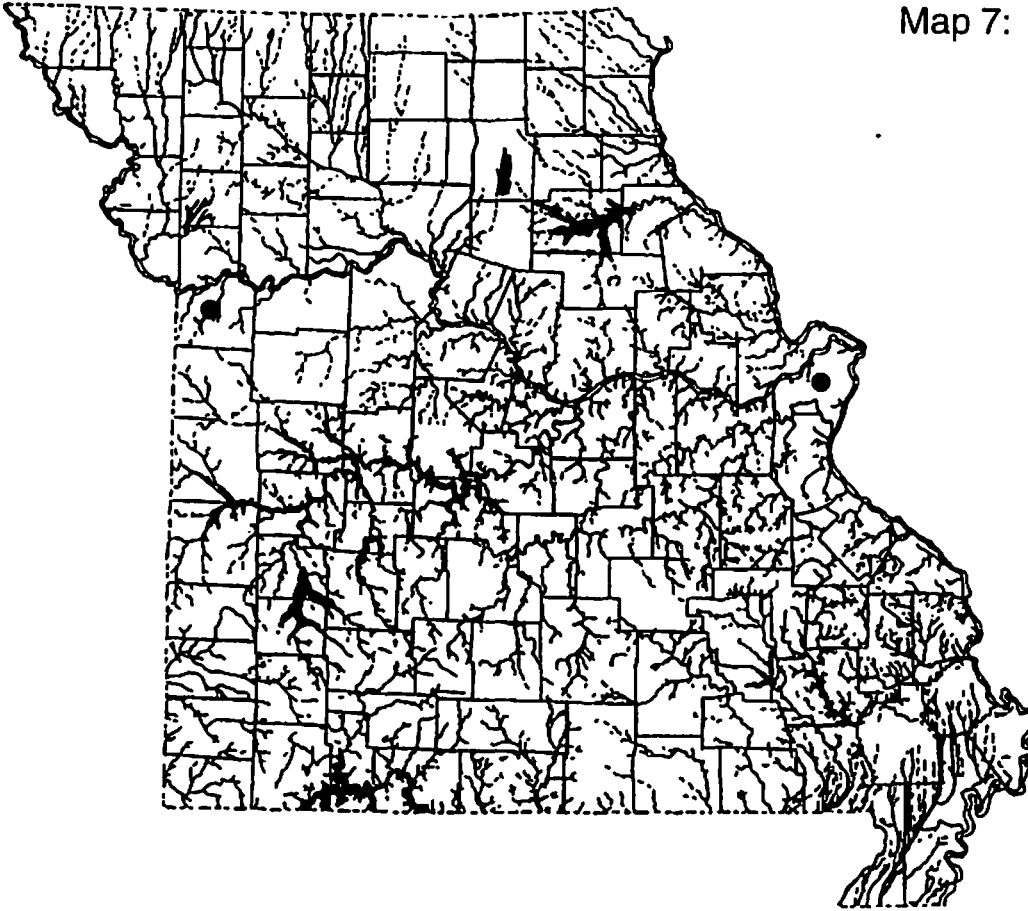
Diagnostic characters:

Shell 4.0-5.0mm high, taller than wide, conical, somewhat turbinat, rather inflated, wide and obtusely conical spire with flattened apex, 4.5 regularly increasing and often slightly shouldered whorls, body whorl



Figs. 9-14. Shells of the Family Hydrobiidae. FIGS. 9-10. *Amnicola limosa* (Say): Apertural and right-side views. UMMZ 197656. Shell length 3.8mm, 4 1/8 whorls. FIGS. 11-12. *Amnicola stygia* Hubricht: Apertural and right-side views. UCM 39484. Shell length 2.1mm, 3 1/4 whorls. FIGS. 13-14. *Antrobia culveri* Hubricht: Apertural and right-side views. FMNH 268210. Shell length 1.8mm, 3 1/2 whorls.

Map 7: *Amnicola limosa*
(Say)



globose, small nuclear whorl on same plane as second whorl, umbilicus narrow; aperture ovate, about 1/2 the height of shell, usually with a light parietal callus.

Distribution in Missouri:

Found in the Meramec River and tributaries of the Missouri River near Kansas City (Map 7).

Records:

JACKSON COUNTY: (UMMZ) 119963-JACKSON COUNTY; **ST.**

LOUIS COUNTY: (UMMZ) 197665 & 197656-ST. LOUIS COUNTY.

Remarks:

This species is distributed across most of North America. The few records for Missouri are probably related to its very small size and tendency to occur in mud and on submerged vegetation.

Amnicola stygia Hubricht 1971

Common name: stygian amnicola

Figures 11-12

Diagnostic characters:

Shell about 2.4mm tall, broadly conic, wider than tall, thin and very fragile, opaque, 3-3.5 well-rounded whorls, nuclear whorl raised, umbilicus wide; aperture round, lip barely fused to parietal wall or sometimes free; operculum spiral.

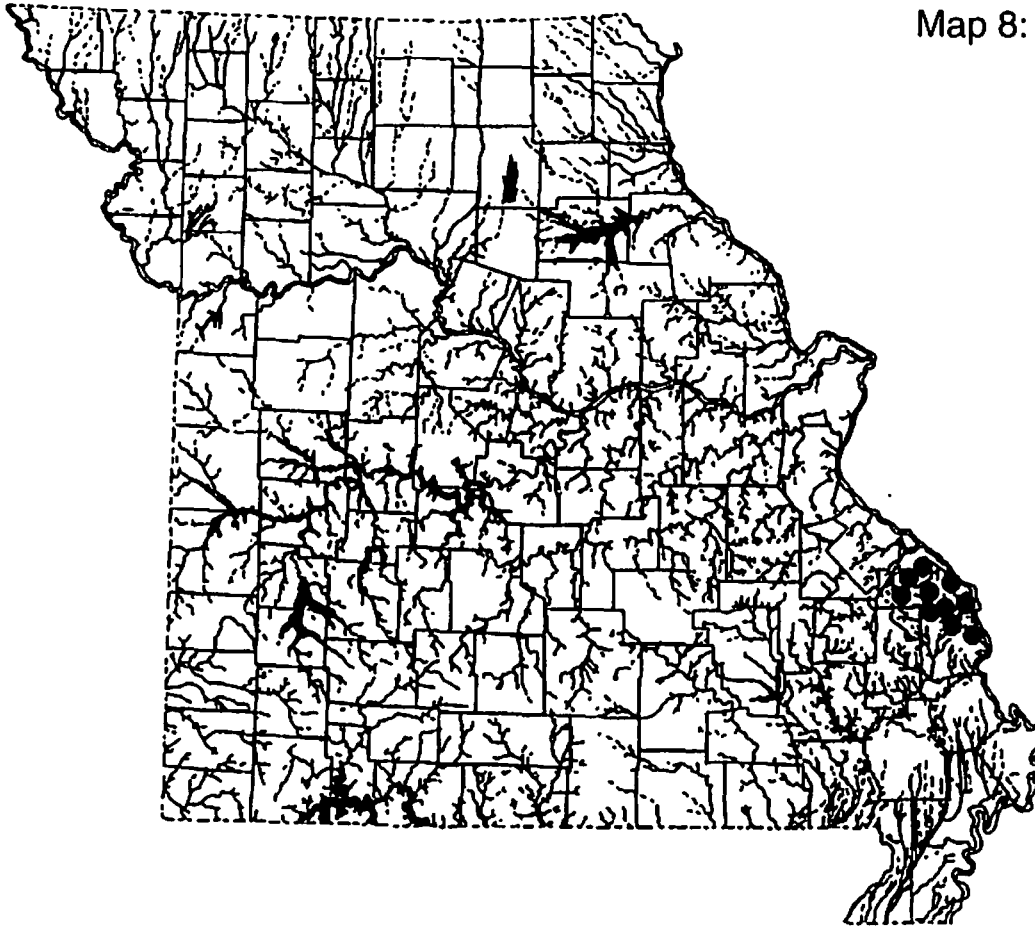
Distribution in Missouri:

Cave streams in Cape Girardeau and Perry counties (Map 8).

Records:

CAPE GIRARDEAU COUNTY: 32805-LANG SPRING, T33NR12E Sec 05; 39483-SCHULTZ HILL CAVE SPRING, LAT. 37 15' 10"N LONG. 89 44' 26"W; **PERRY COUNTY:** 32790 & 32973-BEROME MOORE CAVE, T35NR10E Sec 02; 32810-CITY PARK CAVE, T35NR11E Sec 20; 32811-FLAT ROCK CAVE, T33NR13E Sec 06; 32802-INDIAN CREEK CAVERNS SPRING, T34NR12E Sec 17; 32793-MERTZ CAVE, T35NR11E Sec 16; 32801 & 39484-SHRINE CAVE, T34NR12E Sec 31; 32799-76 CAVE, T35NR13E Sec 32; 37346-TOM MOORE CAVE, T35NR10E Sec 02.

Map 8: *Amnicola stygia*
Hubricht



Remarks:

A troglodytic species endemic to Missouri.

GENUS *ANTROBLA* HUBRICHT 1971

Genus characters:

Shell small, low conical, broadly umbilicate, with convex whorls. Aperture subcircular, inner lip broadly adnate to parietal wall. Protoconch slightly wrinkled; sculpture interrupted by narrow, regularly-spaced, shallow spiral grooves which continue onto early teleoconch. Remaining teleoconch smooth. Operculum broadly ovate, paucispiral. (Hershler & Thompson, 1992).

Genus is monospecific.

***Antrobia culveri* Hubricht 1971**

Common name: Tumbling Creek cavesnail
Figures 13-14

Diagnostic characters:

Shell 1.9-2.3mm tall, pale yellow, subhyaline, very slightly taller than wide, low conical, spire depressed,

3.5 well-rounded whorls, nuclear whorl depressed with narrow regularly spaced shallow spiral grooves which may continue across the rest of the shell.

Distribution in Missouri:

Known only from a single stream in Tumbling Creek Cave in the White River basin of the Ozarks (Map 9).

Records:

TANEY COUNTY: (FMNH) 164171 (HOLOTYPE), (FMNH) 164170 (PARATYPE), (FMNH) 168210 (PARATYPES)-TUMBLING CREEK CAVE, T22NR17W Sec 26.

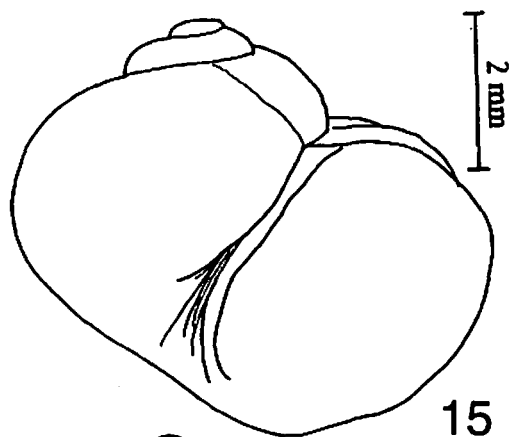
Remarks:

A troglodytic species endemic to Missouri.

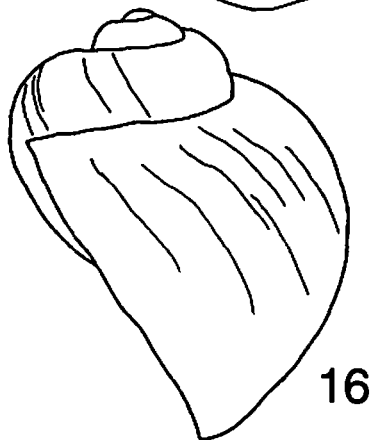
GENUS *BIRGELLA* BAKER 1926

Genus characters:

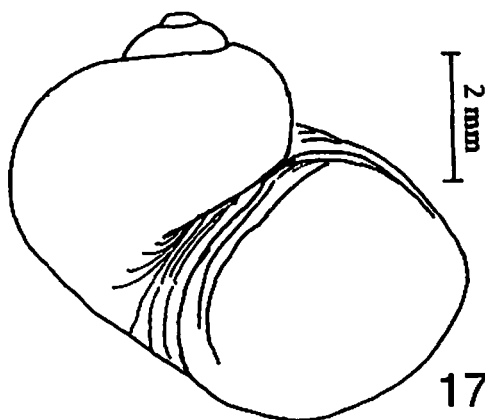
Shell large for family (about 6-9.5mm high), rather solid, subglobose to globose, usually about 0.83-0.87 times as wide as high (occasionally equally high as



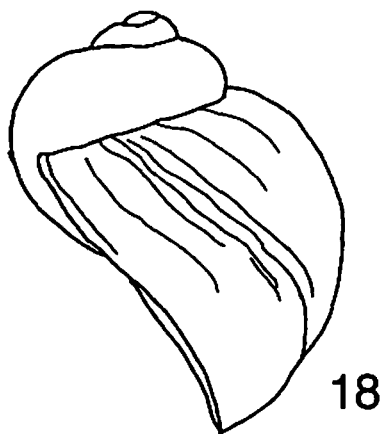
15



16



17



18

wide), spire very depressed, about 4.3 whorls, body whorl very large, protoconch sculptured with heavy step-like wrinkles with superimposed spiral threads, narrowly umbilicate (occasionally imperforate in older specimens); aperture very large, dilated, roundly ovate, somewhat angular above, somewhat produced below.

***Birgella subglobosa* (Say 1825)**

Common name: globe siltsnail

Figures 15-18

Diagnostic characters:

Same as genus.

Distribution in Missouri:

Known from the Meramec and Mississippi rivers near St. Louis and the Osage River (Map 10).

Records:

BENTON COUNTY: (UMMZ) 117200-**BENTON COUNTY:** ST.

LOUIS COUNTY: (UMMZ) 177032, 197756, 197757, & 197759-
ST. LOUIS COUNTY.

Remarks:

This species is fairly wide spread in the Interior Basin and Great Lakes drainages. Generally considered a species of large rivers and lakes, it appears to develop the greatest degree of inflation and size in those habitats. It also may inhabit smaller streams and spring runs.

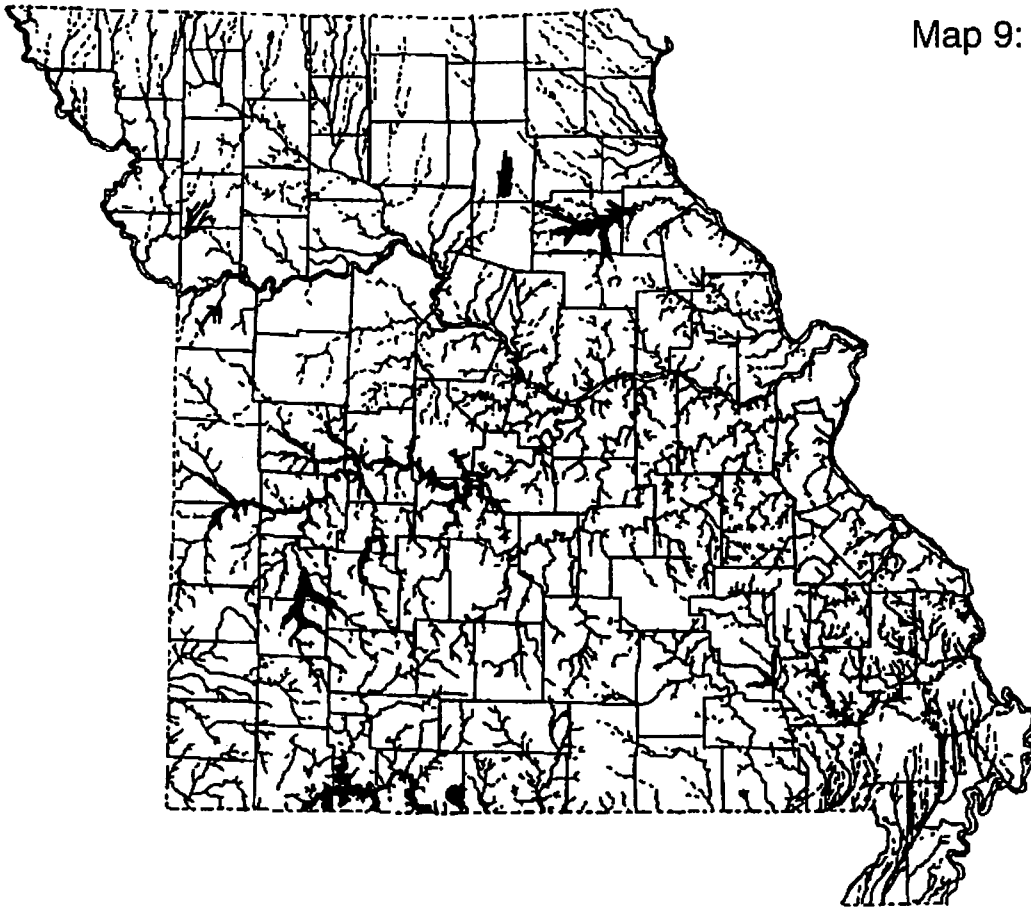
GENUS *CINCINNATIA* PILSBRY 1891

Genus characters:

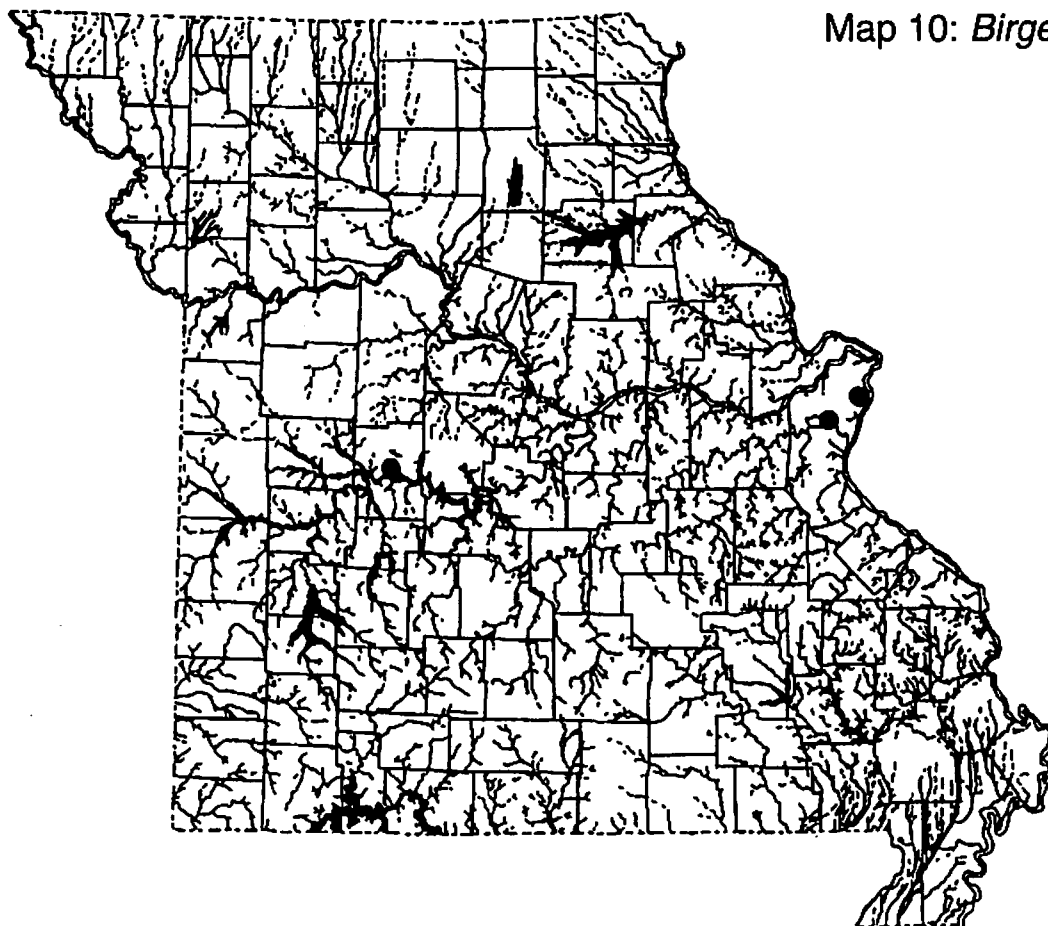
Shell about 2.0-6.0mm high, width 0.54-0.81 of length, relatively thick and solid, conical to cylindrical-conic or turbinate, imperforate to umbilicate, spire 0.80-1.7 times the length of the aperture, 3.9-5.7 flatly to strongly convex and occasionally shouldered whorls, nuclear whorls nearly depressed or moderately elevated (0.2-0.5mm in diameter), surface shiny with fine incremental striations; aperture ovate to elliptical, outer

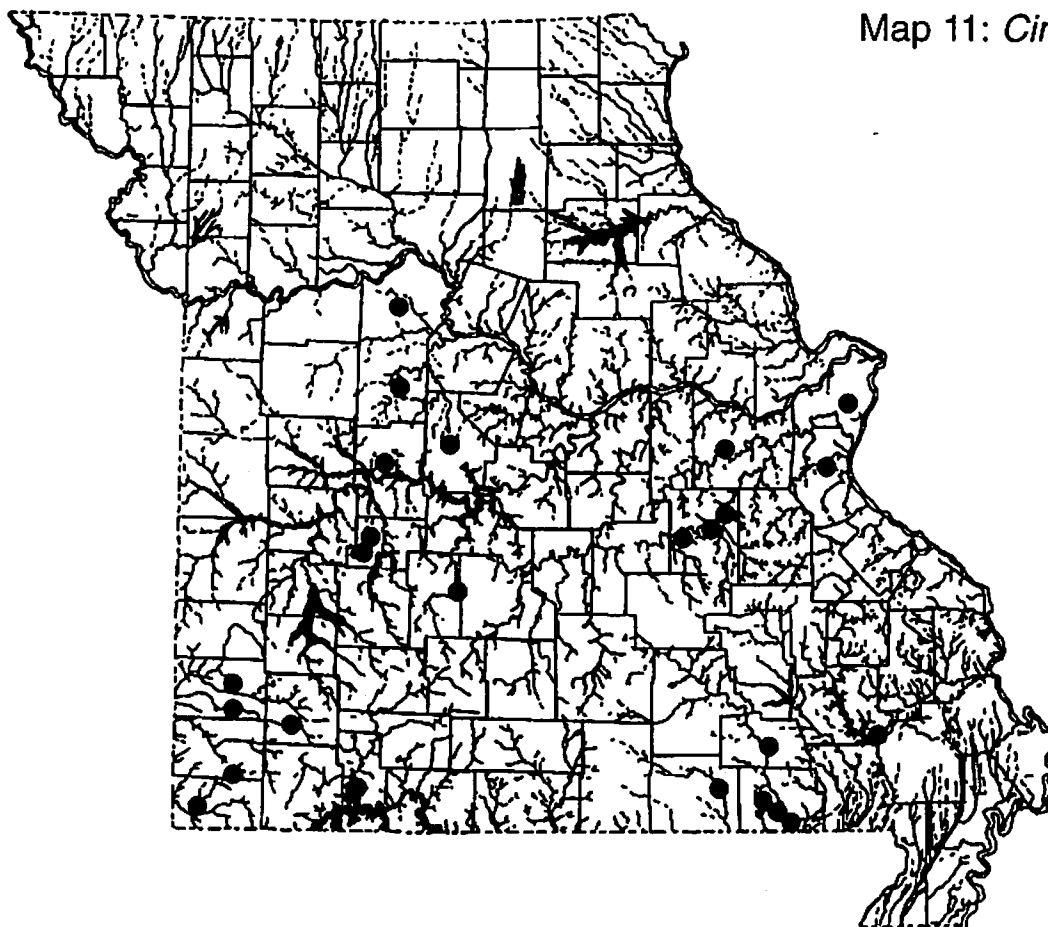
Figs. 15-18. Shells of the Family Hydrobiidae. FIGS. 15-16. *Birgella subglobosa* (Say): Apertural and right-side views. UMMZ 177032. Shell length 6.2mm, 3 1/2 whorls. Figs. 17-18. *Birgella subglobosa* (Say): Apertural and right-side views. UMMZ 197757. Shell length 7.7mm, 4 whorls.

Map 9: *Antrobia culveri*
Hubricht



Map 10: *Birgella subglobosa*
(Say)





Map 11: *Cincinnatia integra*
(Say)

lip rounded, columellar margin weakly reflected, partially obscuring or closing the umbilicus.

***Cincinnatia integra* (Say 1821)**

Common name: midland siltsnail

Figures 19-20

Diagnostic characters:

Shell 5.0-6.0mm tall, width/length about 0.70, conical, elevated spire broadly conic, 5-6 convex, somewhat shouldered whorls, elevated nuclear whorl forms roundly pointed apex, umbilicated, color greenish to yellowish-brown or darker; aperture ovate and touches the body whorl only at apical extreme.

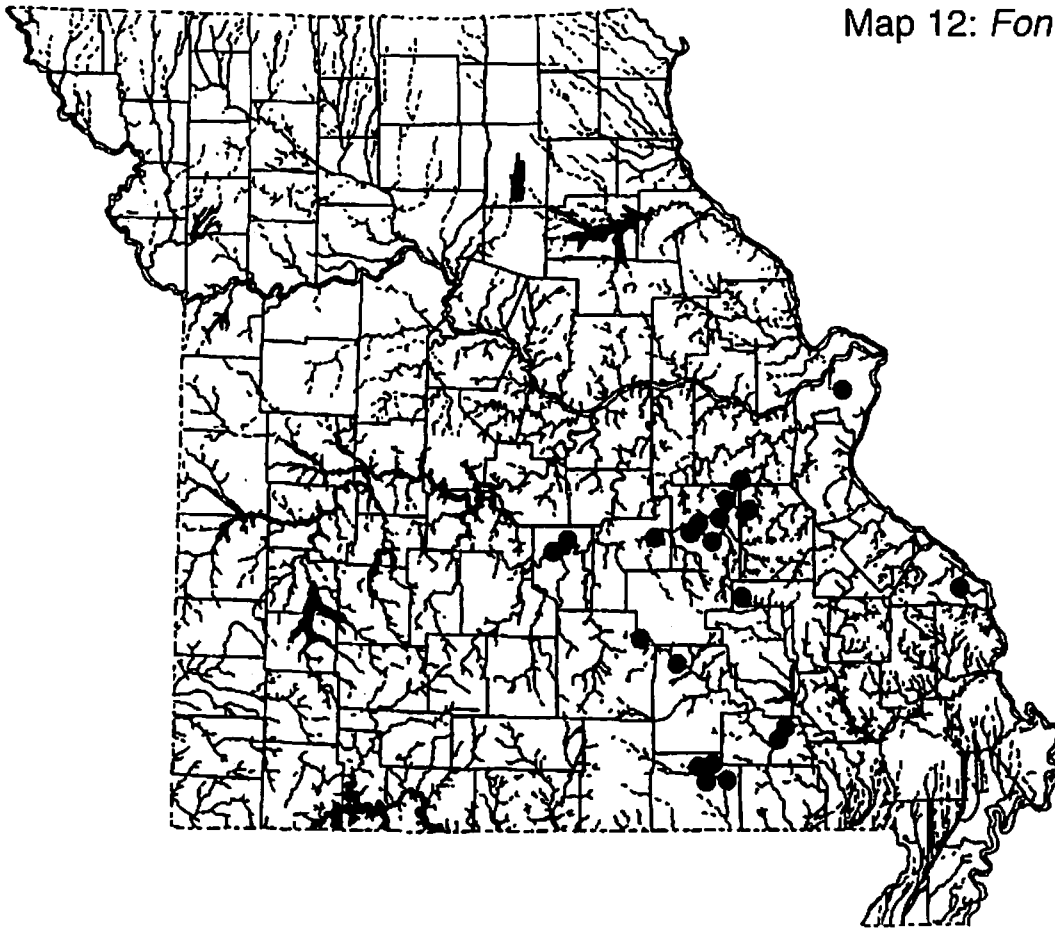
Distribution in Missouri:

Widespread throughout the drainage systems of the Ozark Plateaus. The type locality of Hershler and Thompson's (1996) neotype is the Meramec River, 2.9 km NNW of Steelville, Crawford, Missouri. A few records outside the Ozarks indicate that historically it may have been distributed across most of the state (Map 11).

Records:

BENTON COUNTY: (UMMZ) 119405-BENTON COUNTY;
CARTER COUNTY: (UMMZ) 197641 & 219638-CARTER COUNTY; **CRAWFORD COUNTY:** (USNM-NEOTYPE) 860651-MERAMEC RIVER; 40163-HUZZAH CREEK, T37NR02W Sec 17; 37104-MERAMEC RIVER, T38NR04W Sec 29 NE4NE4; 37746-ONONDAGA CAVE STATE PARK, T39NR03W Sec 34 NE4;
DALLAS COUNTY: 33714 & 36068-BENNETT SPRING IN BENNETT SPRING STATE PARK; **FRANKLIN COUNTY:** (UMMZ) 197626, 197627, 197629 & 197643-FRANKLIN COUNTY; **HENRY COUNTY:** (UMMZ) 119432-HENRY COUNTY; **HICKORY COUNTY:** 37059-WEABLEAU CREEK @ CO Hwy H, T36NR23W Sec 20; 37064-LITTLE WEABLEAU CREEK @ U.S. Hwy 54/MO Hwy 83, T37NR23W Sec 32; **JASPER COUNTY:** 29534-CENTER CREEK @ U.S. ALT 71, T28NR31W Sec 33/34; (UMMZ) 119431-JASPER COUNTY; **JEFFERSON COUNTY:** (UMMZ) 197625-JEFFERSON COUNTY; **LAWRENCE COUNTY:** (UMMZ) 119430-LAWRENCE COUNTY; **MCDONALD COUNTY:** 40085-ELK RIVER @ GINGER BLUE; 40088-ELK RIVER @ MT. SHIRA ACCESS; 40133-BIG SUGAR CREEK 2 MI E OF PINEVILLE; **MORGAN COUNTY:** (UMMZ) 119429-MORGAN COUNTY; **NEWTON COUNTY:** 40115-INDIAN CREEK 2 MI SW OF BOULDER CITY; **OREGON COUNTY:** 31808-ELEVEN POINT RIVER @ MO Hwy 160, T23NR02W Sec 17; **PETTIS COUNTY:** (UMMZ) 16340,

Map 12: *Fontigens aldrichi*
(Call & Beecher)



69811, 69813, 119424, & 119425-PETTIS COUNTY; RIPLEY COUNTY: 36080-CURRENT RIVER (CR), T22NR02E Sec 04 SE4; 36088-(CR), T22NR02E Sec 36 SE4NW4; 36093-(CR), T21NR02E Sec 01 NC; ST. LOUIS COUNTY: (UMMZ) 197630, 197646, & 219639-ST. LOUIS COUNTY; SALINE COUNTY: (UMMZ) 69812 & 119426-SALINE COUNTY; STONE COUNTY: (UMMZ) 119435-STONE COUNTY; WAYNE COUNTY: 35920-STANLEY CREEK @ CO Hwy Z, T27NR08E Sec 18.

Remarks:

This species generally has been known as *Cincinnatia cincinnatiensis* (Anthony 1840). The recent designation of a neotype for *Paludina integra* Say, 1821, by Hershler & Thompson (1996) validates that name as the oldest available epithet for this species and relegates *cincinnatiensis* to the status of a junior subjective synonym under *integra*. Previously, *integra* generally had been referred to as a species of *Campeloma* (Viviparidae).

Cincinnatia integra is widespread across much of the Interior Basin and portions of drainages in the Great Lakes and some other adjacent regions (see Hershler & Thompson, 1996). Historical distributions

in Hershler & Thompson (1996) suggest that its absence from most prairie regions in Missouri may be related to channel modifications to which many streams in these areas have been subjected.

GENUS *FONTIGENS* PILSBRY 1933

Genus characters:

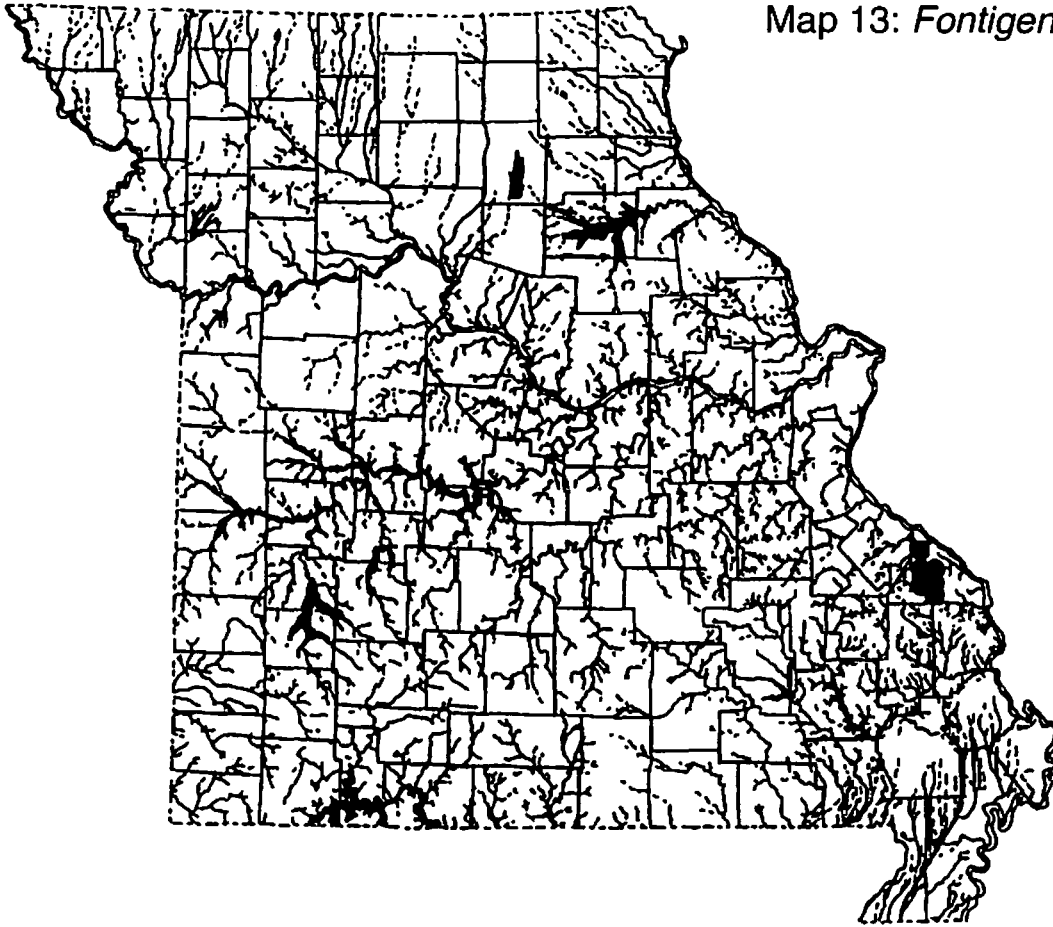
Shell less than 5.0mm tall, ovate to turreted, clear white, opaque to transparent with amber-brown periostracum, spire short to elongated, whorls moderately to well rounded frequently with slight adapical shoulders, protoconch nearly flat to slightly protruding with sculpture of spiral striae, striae sometimes extending onto rest of shell, growth lines usually prominent, Missouri species umbilicate; aperture ovate to subcircular, slightly separate from or adapically adnate to body whorl, inner lip thickened and reflected.

Fontigens aldrichi (Call & Beecher 1886)

Common name: Ozark springsnail

Figure 21

Map 13: *Fontigens antroecetes*
(Hubricht)



Diagnostic characters:

Shell 1-3mm tall, broadly conical, usually low trochoid, rarely elongate conic, height/width 107-163%, whorls 3-5, apex almost flat, protoconch with broadly and uniformly separated incised spiral lines; aperture ovate.

Distribution in Missouri:

Found in spring runs and cave streams in the drainages of the Missouri, Gasconade, Meramec, St. Francis, Black and Current rivers in the Ozark Plateaus of eastern Missouri (Map 12).

Records:

CARTER COUNTY: 33753-MIDCO CAVE, T27NR02W Sec 27; 33755-MIDCO CAVE SPRING, T27NR02W Sec 22; **CRAWFORD COUNTY:** 33017 & 33757-GREENS BLUFF CAVE, T40NR02W Sec 24; 32979-HAMILTON CAVE, T40NR01W Sec 30; 34141-HUZZAH CREEK, T38NR03W Sec 23; 33756 & 33778-ONONDAGA CAVE T39NR03W Sec 35; 33776-ONONDAGA CAVE SPRING, T39NR03W Sec 35; 37018-UNNAMED CAVE SPRING, T38NR03W Sec 04; **DENT COUNTY:** 36142-MONTAUK SPRING IN MONTAUK SPRING STATE PARK, T32NR27W Sec

22; **FRANKLIN COUNTY:** 32978 & 33784-BEAR CAVE IN MERAMEC STATE PARK (MSP), T40NR02W Sec 12; 32975-FISCHER'S CAVE IN (MSP), T40NR01W Sec 06; **IRON COUNTY:** 38686-UNNAMED FEN, T34NR01E Sec 07 SE4; **OREGON COUNTY:** 36025-BARRETT SPRING, T25NR03W Sec 03; 33022-DEADMAN CAVE ON ELEVEN POINT RIVER (EPR), T25NR04W Sec 27 NE4; 36135-FALLING SPRING CAVE, T25NR03W Sec 04; 36134-TURNER SPRING CAVE ON (EPR), T25NR04W Sec 03; 33018-UNNAMED SPRING ON (EPR), T24NR04W Sec 02 SW4SE4; 36033-WALTER'S CAVE SPRING, T25NR03W Sec 22; **PERRY COUNTY:** 32797-SOEHL CAVE, T34NR12W Sec 04; **PHELPS COUNTY:** 32987-MERAMEC SPRING, T37NR06W Sec 01; **PULASKI COUNTY:** 34132-PIQUET CAVE, T37NR11W Sec 04; 34133-SPRING JUST N OF PIQUET CAVE, T37NR11W Sec 04; 34131-TUNNEL CAVE, T37NR12W Sec 33; **ST. LOUIS COUNTY:** 32775 & 37341-ROCKWOOD RESERVATION SPRING, T44NR03E Sec 10; **SHANNON COUNTY:** 36074-PULLTITE SPRING, T30NR05W Sec 11 SE4SW4; **WASHINGTON COUNTY:** 36040-GREAT SCOTT CAVE, T39NR01W Sec 23.

Remarks:

A species restricted to spring runs and caves, *Fontigens aldrichi* probably is endemic to Missouri.

Hershler et al. (1990) questioned the taxonomic status of two supposed populations reported from the upper Illinois River Basin.

Fontigens antroecetes (Hubricht 1940)

Common name: enigmatic cavesnail

Figure 22

Diagnostic characters:

Shell 2.5-4.5mm tall, elongate-conic, height/width 140-180%, whorls 4.0-4.5, apex blunt, protoconch sculptured with numerous incised spiral lines; aperture broadly ovate, basal region of outer lip may be expanded.

Distribution in Missouri:

Found in cave streams in Perry County (Map 13). Hershler et al. (1990) also reported it from Cape Girardeau and St. Louis counties.

Records:

PERRY COUNTY: 32788, 32789, 32972, 37687, 37689 & 37690-BEROME MOORE CAVE, T35NR10E Sec 02; 40159-BRIAR CAVERNS, T36NR10E Sec 23; 32807-CITY PARK CAVE, T35NR11E Sec 20; 39495-CREVICE CAVE, T35NR10E Sec 12; 40155-KNOB SCHOOL SPRING CAVE, T36NR10E Sec 14; 32792-MERTZ CAVE, T35NR11E Sec 16; 38614-MYSTERY CAVE, T34NR11E Sec 09; 32970, 39492-STREILER CAVE IN PERRYVILLE LAT. 37° 43' 52"N; LONG. 89° 52' 32"W; 32968-TAYLOR'S CAVE, T35NR10E Sec 12; 37008, 37010, 37011 & 37345-TOM MOORE CAVE, T35NR10E Sec 02.

Remarks:

A troglodytic species endemic to Missouri and a small portion of the Ozarks east of the Mississippi River in Illinois.

Fontigens proserpina (Hubricht 1940)

Common name: proserpine cavesnail

Figure 23

Diagnostic characters:

Shell 1.9-3.9mm tall, elongate-conic, spire rather narrow, height/width 173-224%, whorls 4.75-6.75, apex protruding, protoconch with numerous striae usually extending across entirety of shell, striae sometimes reduced or absent on later whorls, elevated growth lines may produce cancellate appearance; aperture broadly ovate to subcircular.

Distribution in Missouri:

Ozark cave streams in drainages of Mississippi River tributaries in St. Louis, Jefferson and Ste. Genevieve counties (Map 14).

Records:

JEFFERSON COUNTY: 37086-RICE CAVE (CLOSED), T41NR05E Sec 04; **STE. GENEVIEVE COUNTY:** 40161-BATTYS CAVE, LAT. 37° 53' 52"N LONG. 89° 59' 15"W; (FMNH) 268226-SALTPETER CAVE; **ST. LOUIS COUNTY:** (FMNH) 268225-DRAIN TILE OUTLET, OSAGE HILLS GOLF COURSE; 40164-ROCKWOODS SPRING, T44NR03E Sec 10 SE4.

Remarks:

A troglodytic species endemic to Missouri.

GENUS *PROBYTHINELLA* THIELE 1928

Genus characters:

Shell 3.0-5.0mm high, width about 0.70 times height, rather solid, globose to subcylindrical, spire truncated with blunt apex, whorls 4-5, first two whorls planorboid and sunken below third whorl, periostracum white or gray to tan, umbilicus wide; aperture subovate, about 40% as high as the shell, inner lip adnate to parietal wall or occasionally detached, columella reflected.

Probythinella emarginata (Küster 1852)

Common name: delta hydrobe

Figures 24-25

Diagnostic characters:

Same as genus.

Distribution in Missouri:

This species has been collected from the Meramec River and lower reaches of Missouri River tributaries (Map 15).

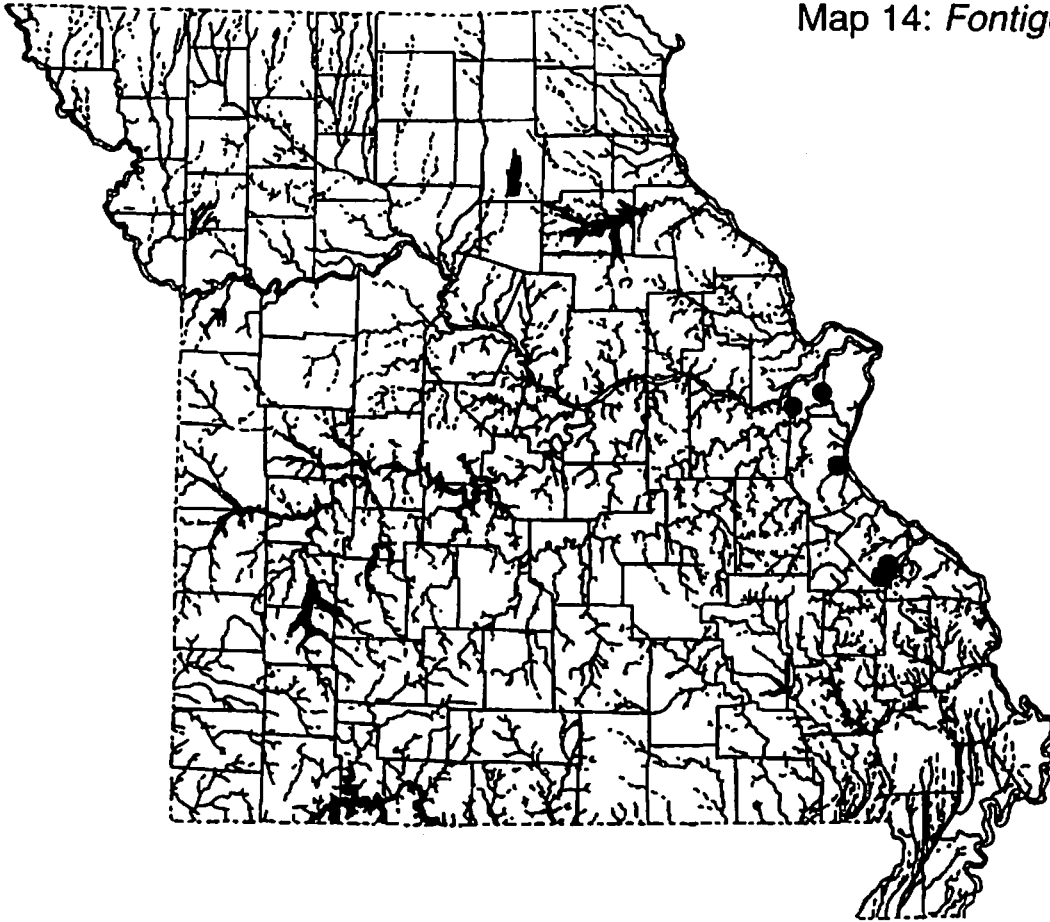
Records:

OSAGE COUNTY: (UMMZ) 197613-OSAGE COUNTY; **ST. LOUIS COUNTY:** (UMMZ) 54626, 197611 & 197612-ST. LOUIS COUNTY.

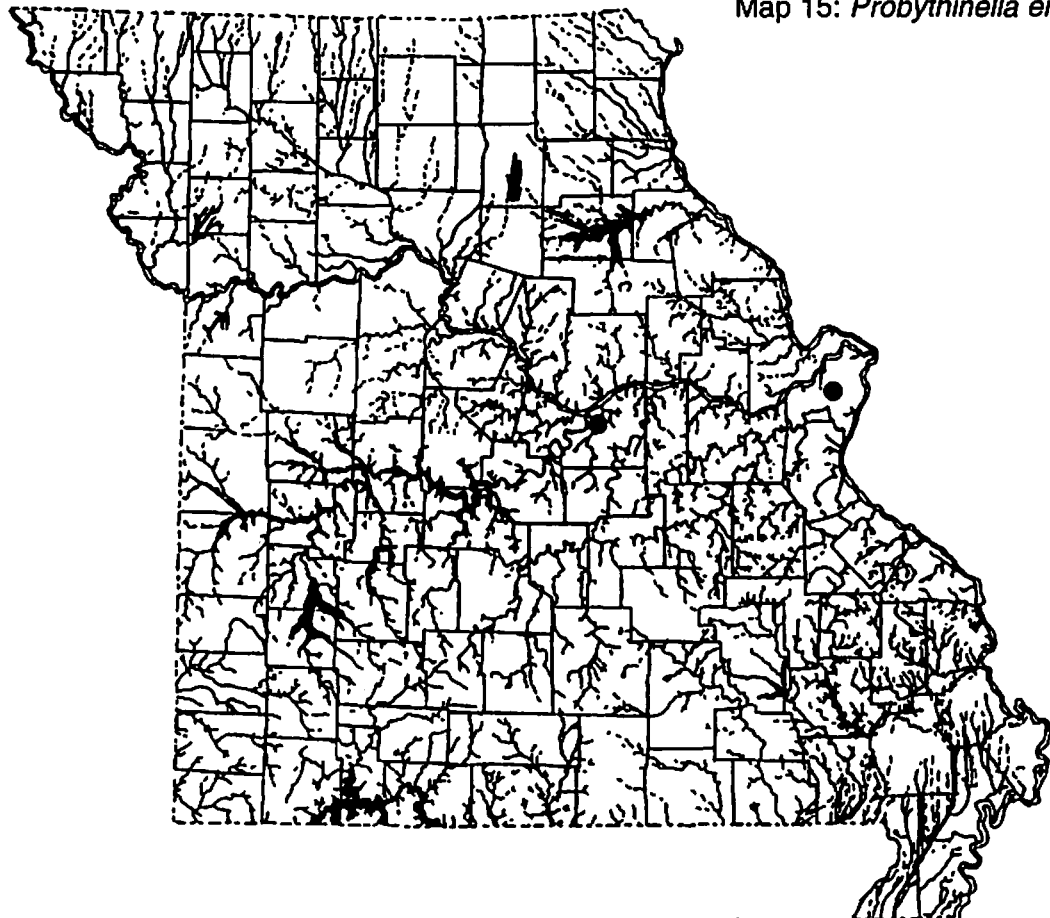
Remarks:

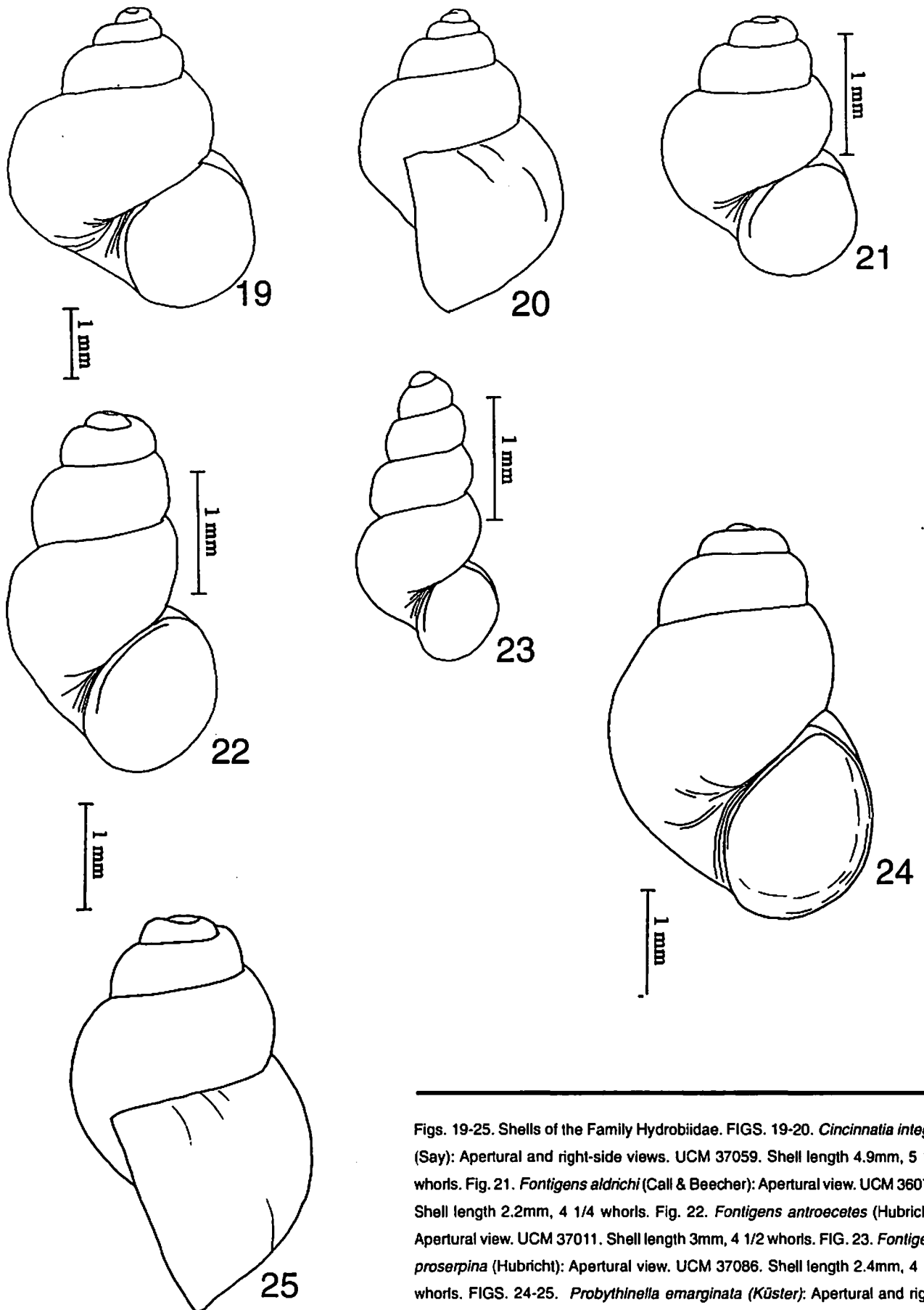
Prior to Hershler's (1996) recent revision of *Probythinella*, this species was known as *P. lacustris* (Baker 1928). It is distributed across most of North

Map 14: *Fontigens proserpina*
(Hubricht)



Map 15: *Probythinella emarginata* (Küster)

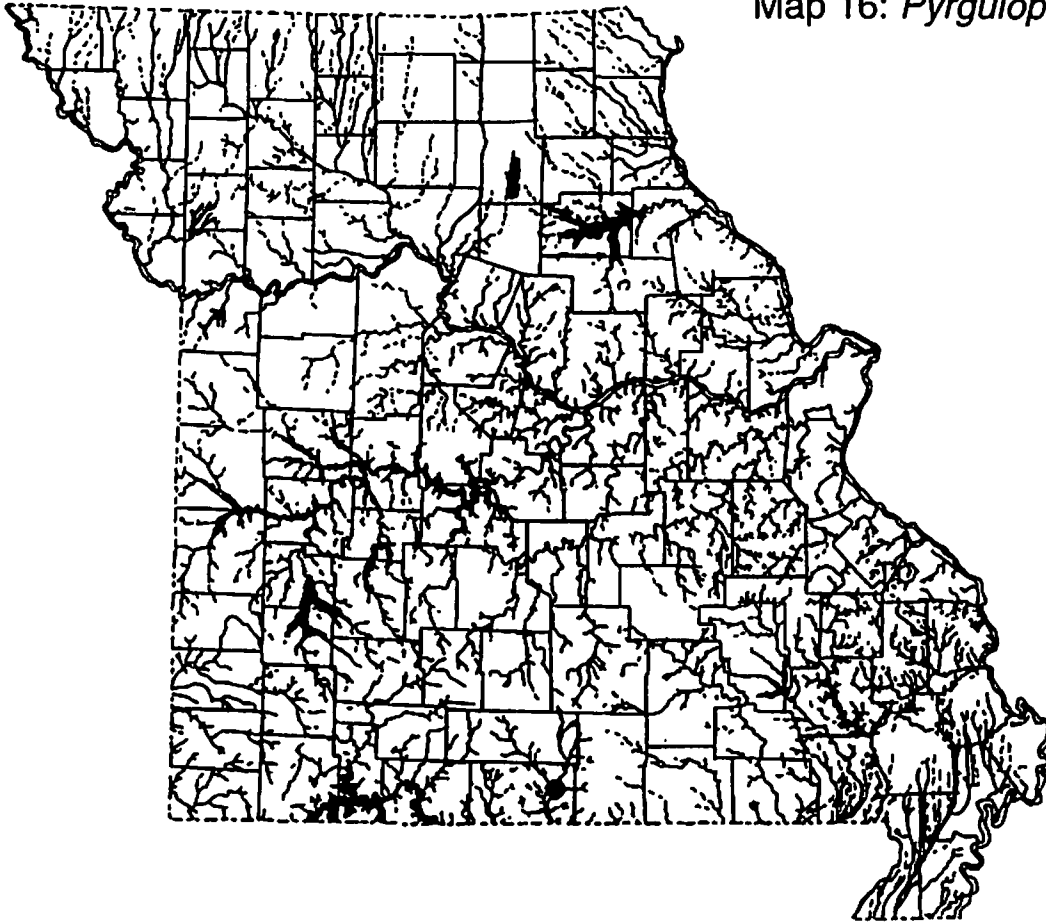




Figs. 19-25. Shells of the Family Hydrobiidae. FIGS. 19-20. *Cincinnatia integra* (Say): Apertural and right-side views. UCM 37059. Shell length 4.9mm, 5 1/8 whorls. Fig. 21. *Fontigens aldrichi* (Call & Beecher): Apertural view. UCM 36074. Shell length 2.2mm, 4 1/4 whorls. Fig. 22. *Fontigens antroecetes* (Hubricht): Apertural view. UCM 37011. Shell length 3mm, 4 1/2 whorls. FIG. 23. *Fontigens proserpina* (Hubricht): Apertural view. UCM 37086. Shell length 2.4mm, 4 1/4 whorls. FIGS. 24-25. *Probythinella emarginata* (Küster): Apertural and right-side views. UMMZ 197611. Shell length 3.8mm, 5 1/4 whorls.

Map 16: *Pyrgulopsis ozarkensis*

Hinkley



America east of the Rocky Mountains. Its small size and the distinctly flattened apex of the shell spire (Figs. 24-25) give it a unique appearance.

GENUS *PYRGULOPSIS* CALL & PILSBRY 1886

Genus characters:

Shell 1.8mm tall, subglobose to elongate-conic or turreted, 4-5 nearly flat to strongly convex and often shouldered whorls, surface with fine growth lines and occasional spiral striae, periphery of later whorls sometimes strongly angled or keeled, protoconch blunt and strongly punctate initially in Missouri species, periostracum gray-brown, imperforate to umbilicate; aperture ovate, lip usually continuous and thickened, broadly adnate to or slightly separated from the body whorl, columellar lip usually slightly reflected.

Pyrgulopsis ozarkensis Hinkley 1915

Common name: Ozark pyrg

Figure 26-27

Diagnostic characters:

Shell 2.5-3.0mm tall, narrowly conical, 5 weakly convex whorls, surface with weak growth lines and sometimes faint spiral lines, umbilicus absent to rimate, periostracum olive-tan; aperture orthocone, columellar lip slightly reflected.

Distribution in Missouri:

Known in Missouri from a single site on the North Fork of the White River (Map 16).

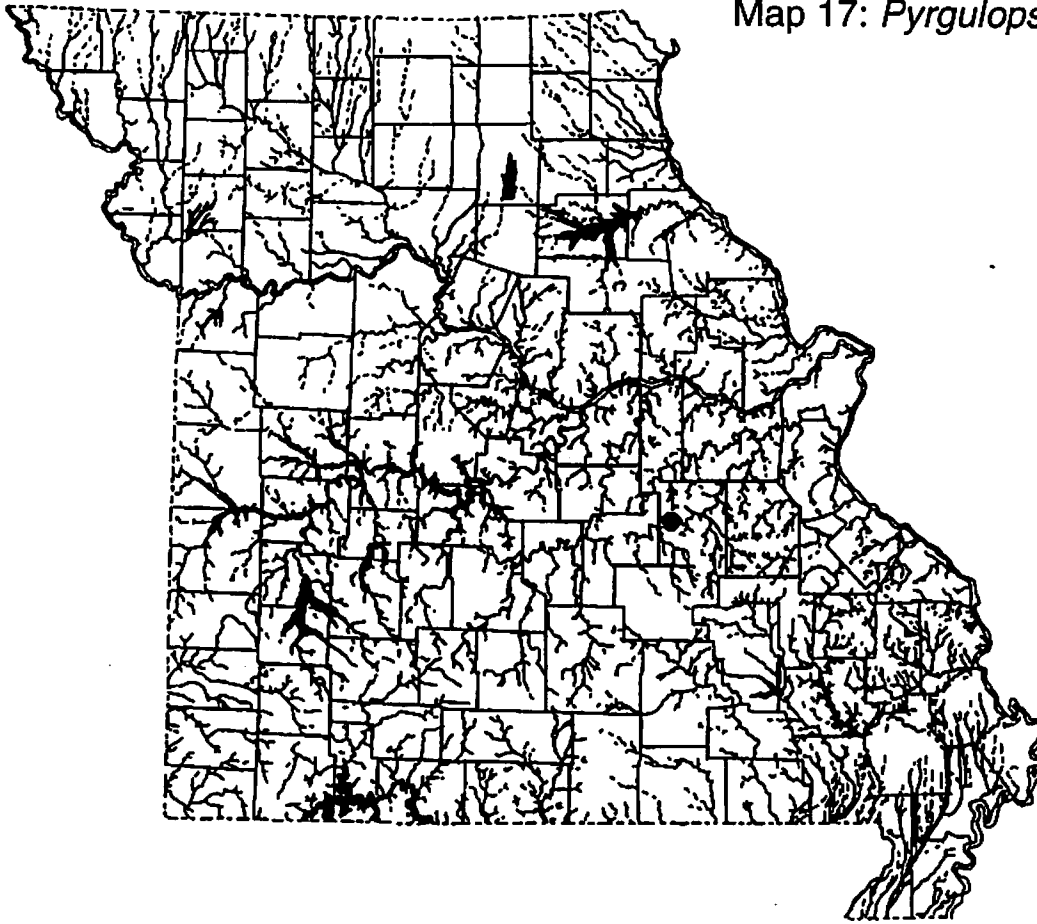
Records:

OZARK COUNTY: 40135, 40136, 40137 & 40138-NORTH FORK OF WHITE RIVER @ CO Hwy H.

Remarks:

This species is quite rare and apparently has been extirpated from all former habitats in Arkansas, including its type locality. Its last surviving populations may occur only in a very short section of the North Fork of the White River.

Map 17: *Pyrgulopsis scalariformis*
(Wolf)



***Pyrgulopsis scalariformis* (Wolf 1869)**

Common name: moss pyrg

Figure 28-30

Diagnostic characters:

Shell 3.5-4.7mm tall, pupiform to narrowly conic, whorls 5.5-6.0, early whorls rounded, later whorls nearly flat, weakly to well developed broad peripheral keel appearing at middle or end of third whorl and extending to aperture, umbilicus nearly absent to narrowly rimate, periostracum light brown; aperture prosocline.

Distribution in Missouri:

Inhabits the Meramec River (Map 17).

Records:

CRAWFORD COUNTY: (FSM) 91725, 91726-CRAWFORD COUNTY.

Remarks:

The typical form of this species has a sharp carina (Fig. 26) around the periphery of the later whorls. This

carina may be absent or only vaguely apparent, producing a relatively narrower appearing shell (Fig. 28). With respect to this character, Hershler (1994) has determined that it is of no taxonomic significance and does not warrant either species or subspecies recognition.

GENUS *SOMATOGYRUS* GILL 1863

Genus Characters:

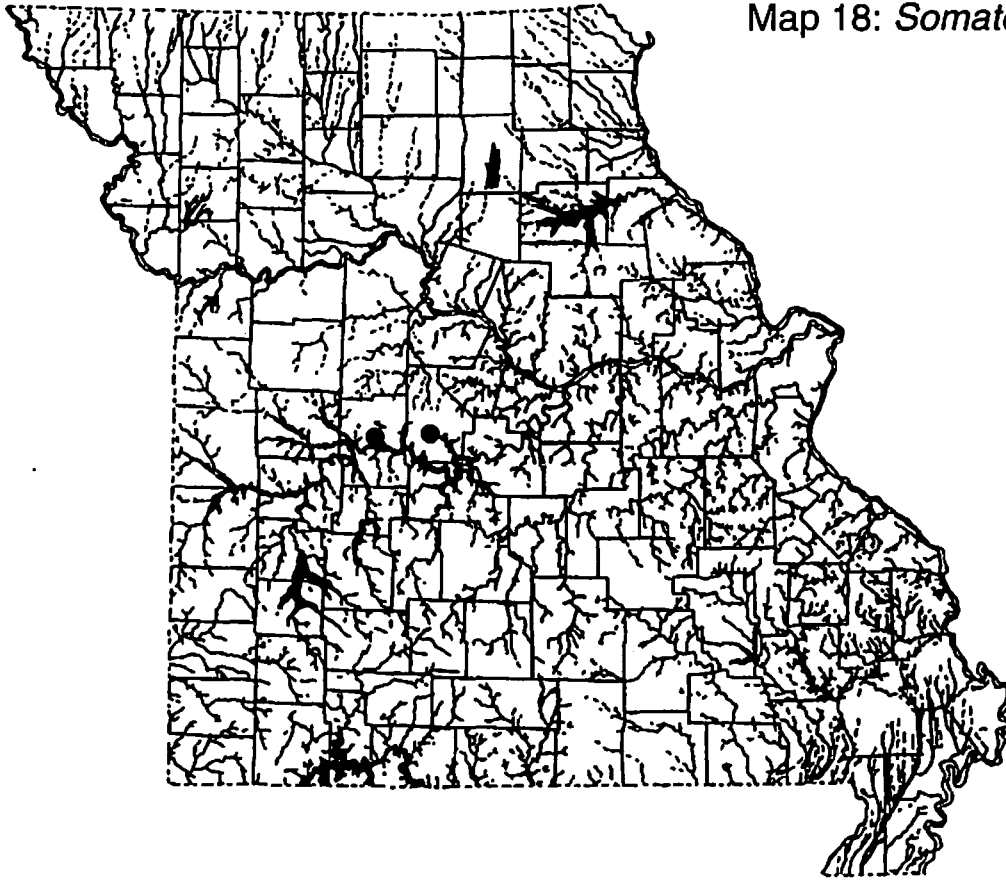
Shell 3-6mm high, globose to conico-globose or turbate, usually thick and solid, smooth, spire usually depressed and broadly to moderately elongated, protoconch spirally punctate or liriate, whorl diameter rapidly increases, body whorl large and generally inflated, imperforate to rimate or narrowly umbilicate; aperture large, broadly ovate, rather oblique, base rounded to subangular, prosocline, columella callously thickened.

***Somatogyrus depressus* (Tryon 1862)**

Common name: sandbar pebblesnail

Figures 31-32

Map 18: *Somatogyrus depressus*
(Tryon)



Diagnostic characters:

Shell to about 5.2mm tall, subglobose, somewhat elongated, about 4 whorls, protoconch punctate or malleated but without lirae, periostracum whitish corneous; lip appressed to parietal wall for a short distance adapically, columella with light to moderate callus reflected over rimate umbilicus.

Distribution in Missouri:

Recorded from the Osage River basin (Map 18).

Records:

BENTON COUNTY: (UMMZ) 28593, 67435 & 116935-
BENTON COUNTY; MORGAN COUNTY: (UMMZ) 161538-
MORGAN COUNTY.

Remarks:

This species inhabits the upper Mississippi River drainage. Missouri appears to be its southern distributional limit. It is quite similar to *Somatogyrus rosewateri* but may be distinguished from that species by its larger size and the punctate rather than lirae protoconch sculpture and by greater development of the parietal-

columellar callus in *S. rosewateri*. The two species are also rather disjunct in distribution.

***Somatogyrus rosewateri* Gordon 1986**

Common name: chert pebblesnail

Figures 33-34

Diagnostic characters:

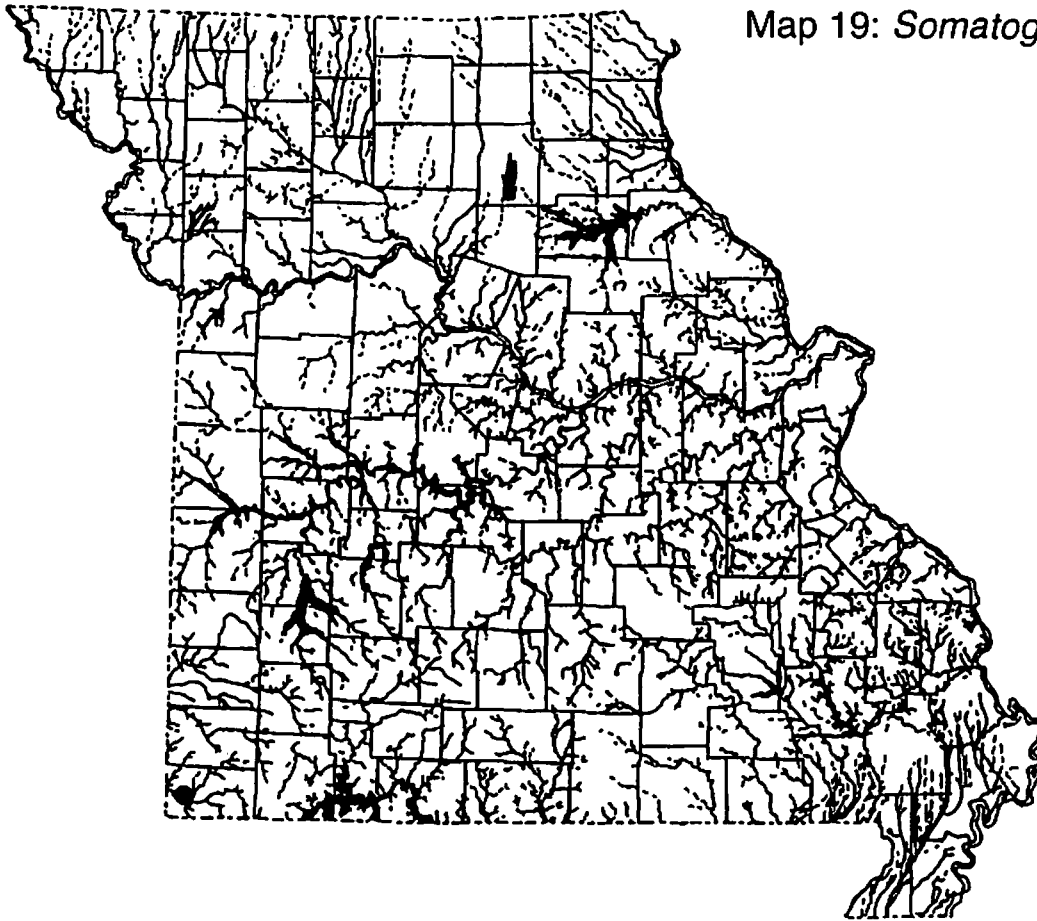
Shell to about 4.2mm tall, subglobose, 4.25 whorls, protoconch ornamented with fine spiral ridges, umbilicus relatively open, periostracum greenish; aperture somewhat sinuous in lateral aspect (Fig. 34) lip appressed across parietal wall by a relatively heavy callus, columella callus thicker and occasionally slightly reflected.

Distribution in Missouri:

Endemic to the middle section of the Elk River from near Ginger Blue downstream to the vicinity of Noel, McDonald County (Map 19).

Records:

MCDONALD COUNTY: 32812 (HOLOTYPE), 32813 (ALLOTYPE),



Map 19: *Somatogyrus rosewateri*
Gordon

32814 (PARATYPE), 32815 (PARATYPE), 32816 (PARATYPE),
32817 (PARATYPE), 32818, 36113 & 40089-ELK RIVER @ MT.
SHIRA ACCESS, T21NR33W Sec 1/2.

Remarks:

Living specimens of this species may appear
orangish to brownish due to the color of the snail's
mantle showing through the subhyaline shell.

FAMILY POMATIOPSIDAE STIMPSON 1865

Family characters:

Shell small, relatively solid, spire elongated,
turreted, smooth, sutures impressed, whorls roundly
convex, umbilicate; aperture ovate to subcircular,
columella slightly reflected over umbilicus, outer lip
simple to slightly reflected; operculum corneous,
paucispiral with minute spiral striations. A single genus
occurs in the United States.

GENUS *POMATIOPSIS* TYRON 1862

Genus characters:

Same as for family.

***Pomatiopsis lapidaria* (Say 1817a)**

Common name: slender walker

Figures 35-36

Diagnostic characters:

Shell to 7mm, spire about 3 times the length of the
aperture, color usually dark brown to dark reddish-
brown; parietal margin with a light callus, outer lip
simple.

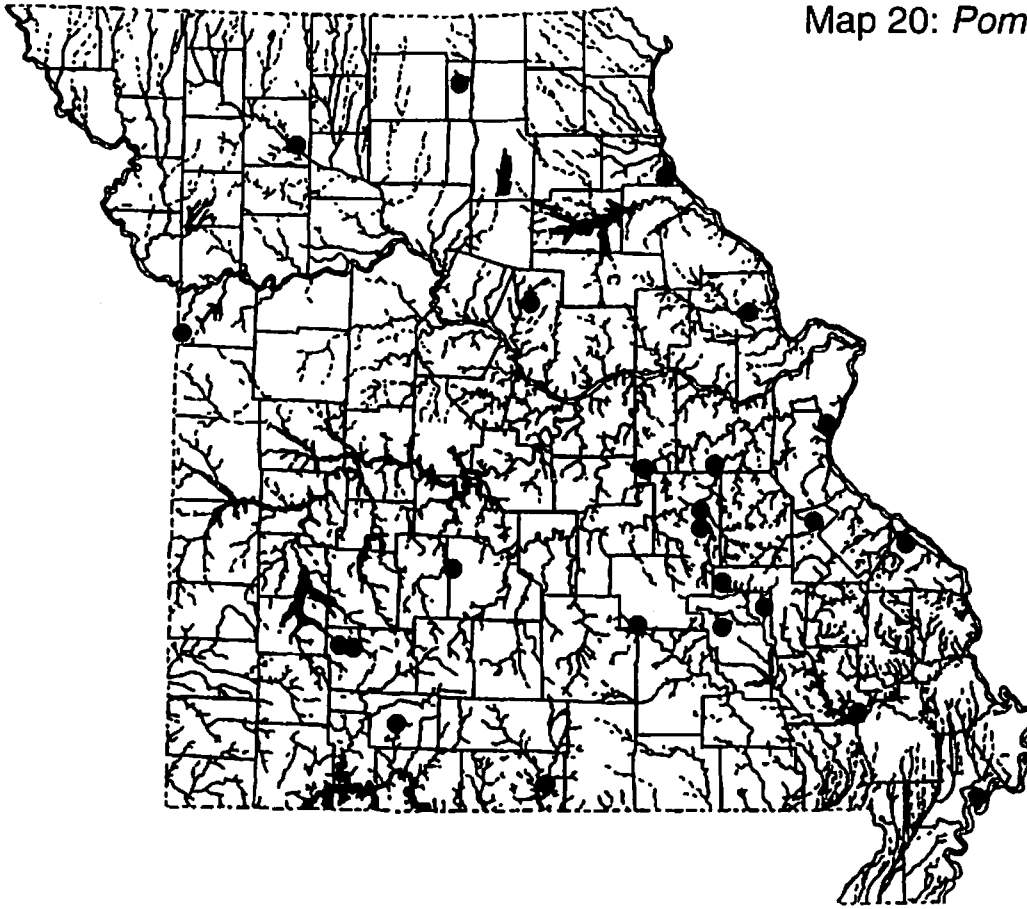
Distribution in Missouri:

Widespread across most of Missouri, although
localized in occurrence due to habitat preferences (Map
20).

Records:

ADAIR COUNTY: 39467-HENRY TRUIT ACCESS T63NR16W
Sec 27; 39513-SUGAR CREEK STATE FOREST, T63NR16W Sec
27 SW4; **BOONE COUNTY:** 38305-ROCKY FORK LAKES
WILDLIFE AREA, T50NR12W Sec 31 SE4; **CHRISTIAN COUNTY:**

Map 20: *Pomatiopsis lapidaria*
(Say)

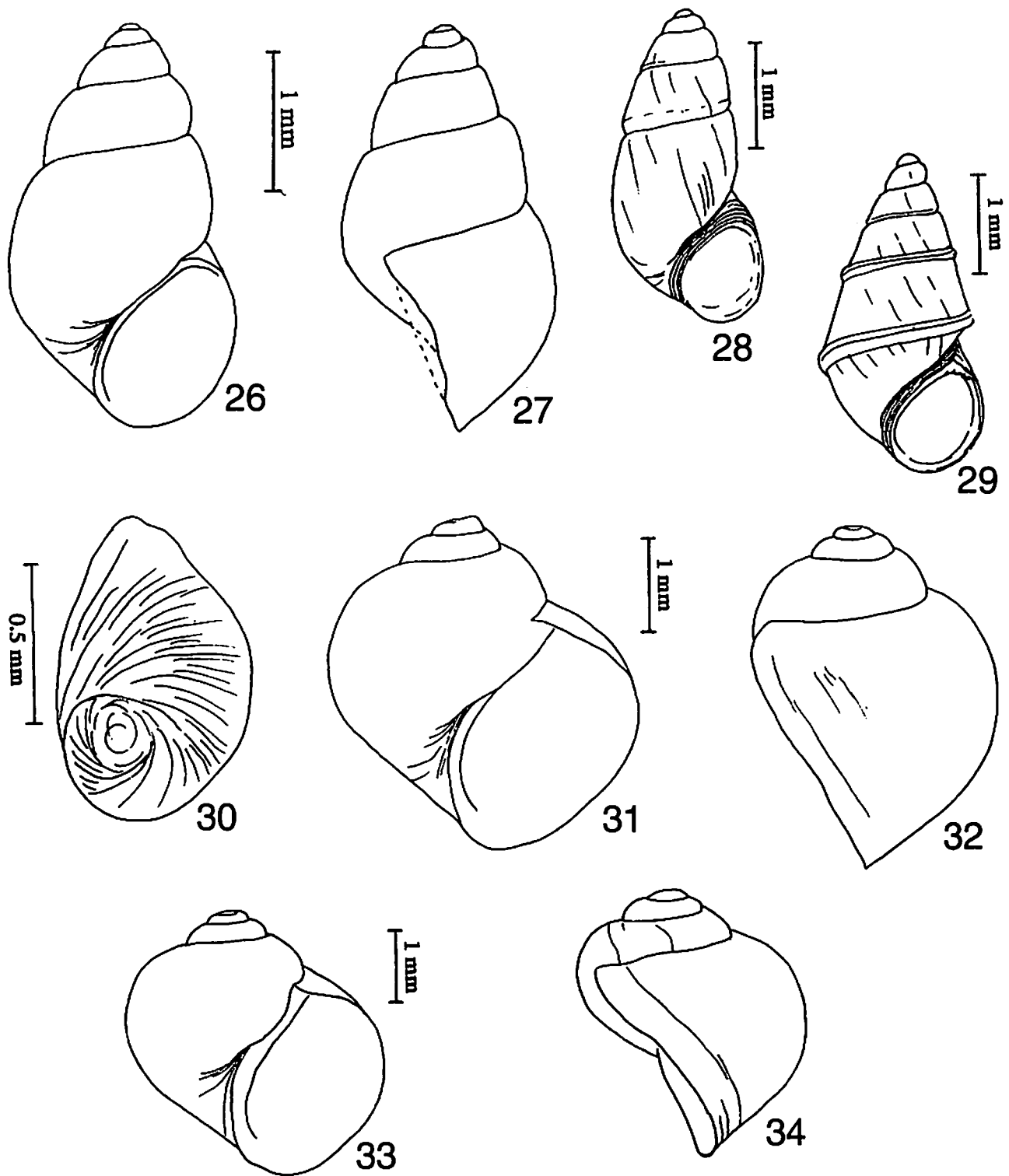


39196-ROADSIDE GLADE, T26NR19W Sec 32 SE4SE4;
CRAWFORD COUNTY: 34142-HUZZAH CREEK, T38NR03W Sec 23; 37745-ONONDAGA CAVE STATE PARK, T39NR03W Sec 34 NE4; **DAVISS COUNTY:** 39531-HOLMES BEND ACCESS, T59NR27W Sec 27; **DENT COUNTY:** 38013-CURRENT RIVER: T32NR07W Sec 36 NE4; **FRANKLIN COUNTY:** 38324, 38639 & 39497-MERAMEC STATE PARK, T40NR01W Sec 06 SW4; **GASCONADE COUNTY:** 38681-MINT SPRING NATURAL AREA, T40NR06W Sec 13 NE4; **GREENE COUNTY:** 39205-ROBERTS FIELD, T30NR24W Sec 10 NE4NE4; 39563-ROCKY BARRENS, T30NR22W Sec 19 C; **IRON COUNTY:** 38687-UNNAMED FEN, T34NR01W Sec 07 SE4; **JACKSON COUNTY:** 38324-WATTS MILL @ 103rd ST. & STATE LINE ROAD; **LACLEDE COUNTY:** 38110-BLUFFS ALONG SPRING BRANCH IN BENNETT SPRING STATE PARK (BSSP), T35NR18W Sec 31 SW4; 38147-HANGING FEN IN (BSSP), T35NR18W Sec 31 SW4; **LINCOLN COUNTY:** 39778-SAVANNAH IN CUIVRE RIVER STATE PARK, T49NR01E Sec 21 NW4; **MARION COUNTY:** 39834-J. THAD RAY WILDLIFE AREA, T57NR05W Sec 13 SW4SW4; **NEW MADRID COUNTY:** 38807 & 38820-DONALDSON POINT STATE FOREST (DPSF), T22NR15E Sec 06 NW4; 39117-(DPSF) T22NR15E Sec 17 SE4; **OZARK COUNTY:** 37676 & 40139-NORTH FORK OF THE WHITE RIVER @ CO Hwy H; **PERRY COUNTY:** 39467-KNOB

SCHOOL SPRING CAVE, T36NR10E Sec 14; **REYNOLDS COUNTY:** 39626-DOLOMITE GLADE IN JOHNSON SHUT-INS STATE PARK, T33NR02E Sec 20 NW4SE4; 33804-GRASSHOPPER CREEK, T32NR01W Sec 30 SC; 33013-GRASSHOPPER FEN T32NR01W Sec 30 SC; **ST. FRANCOIS COUNTY:** 38701-COONVILLE FEN IN ST. FRANCIS STATE PARK, T38NR05E Sec 19 SE4; **ST. LOUIS COUNTY:** 39922-HILLSIDE TO MISSISSIPPI RIVER FLOOD PLAIN, T43NR06E Sec SE4; **STONE COUNTY:** UMMZ 69913, 197033-STONE COUNTY; **WAYNE COUNTY:** 34285 & 34286-UNNAMED FEN, T27NR07W Sec 03 WC.

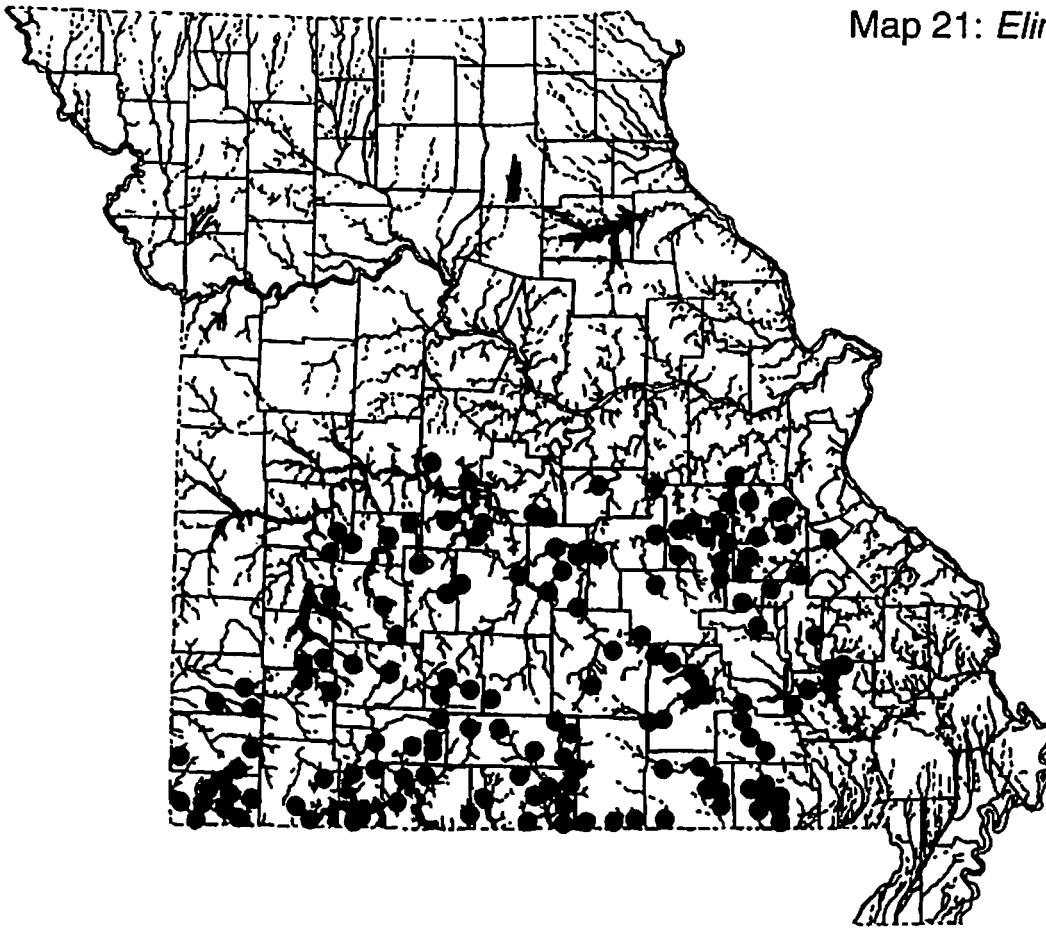
Remarks:

Pomatiopsis lapidaria is sexually dimorphic with a relatively wider body whorl in males. It may be distinguished from hydrobiid species which occur in Missouri by the combination of its relatively large size and considerably more elongate appearance. Immature specimens may resemble *P. cincinnatiensis* (Lea 1840), but may be distinguished from that species by the lesser degree of convexity of the whorls, less deeply impressed sutures, a relatively taller and more slender shape, the dark brown color, and ovate rather than subcircular aperture. Presently, there have been no confirmed



Figs. 26-34. Shells of the Family Hydrobiidae. FIGS. 26-27. *Pyrgulopsis ozarkensis* Hinkley: Apertural and right-side views. UCM 40137. Shell length 3mm, 5 1/4 whorls. FIG. 28. *Pyrgulopsis scalariformis* (Wolf): Apertural view. ANSP 96607. Shell length 3mm, (Redrawn from Hershler, 1994). FIG. 29. *Pyrgulopsis scalariformis* (Wolf): Carinate form. Apertural view. USNM 526623. Shell length 3.3mm, (Redrawn from Hershler, 1994). FIG. 30. *Pyrgulopsis scalariformis* (Wolf): Paucispiral operculum. External view. FSM 91726 (Redrawn from Hershler, 1994). FIGS. 31-32. *Somatogyrus depressus* (Tryon): Apertural and right-side views. UMMZ 116935. Shell length 4mm, 4 whorls. FIGS. 33-34. *Somatogyrus rosewateri* Gordon: Apertural and right-side views. UCM 32812 (Holotype). Shell length 3.8mm, 4 whorls.

Map 21: *Elimia potosiensis*
(Lea)



records of *P. cincinnatiensis* in Missouri.

This species is amphibious. It most often is encountered out of the water on mud or amongst wet leaves and other moist detritus. Although most commonly found near stream banks, it can occur in seeps, marshy areas, and other wetlands that are not particularly near streams.

FAMILY PLEUROCERIDAE FISCHER 1885

Family characters:

Shell small to large, dextral, spiral, subglobose to conically elongated, solid to quite thick, surface smooth to heavily sculptured, typically imperforate; color typically horn, occasionally greenish to almost black, often banded; aperture subcircular to subrhomboidal, base rounded or subangular to canaliculate, outer lip simple; operculum corneous, paucispiral.

Records exist for four species of pleurocerids in Missouri. Two other species (*Lithasia verrucosa* [Rafinesque 1820] and *Pleurocera canaliculatum* [Say 1821]) occur in the Black River drainage system in northern Arkansas just south of the Missouri state

boundary (Gordon, personal observation). These species historically may have inhabited Missouri. If so, they possibly may still occur in isolated localities of the Black or Current rivers near the state border. The Pleuroceridae is another family which requires extensive taxonomic revision.

GENUS *ELIMIA* ADAMS & ADAMS 1854

Genus characters:

Shell small to moderately large, ovate-conic to elongated; aperture subrhomboidal, base subangular but not canaliculate; parietal wall calloused; columella smooth, not twisted; lateral aspect of outer lip may appear curved but not sinuous.

Elimia potosiensis (Lea 1841)

Common name: pyramid elimia

Figures 37-40

Diagnostic characters:

Shell variable, conical, whorls flat to slightly convex, surface generally smooth although it may be

singly carinate in upper whorls, body whorl carinate in juveniles (condition may persist in adults of some populations), color uniform to variably banded.

Distribution in Missouri:

Found throughout the drainage systems of the Ozark Plateaus. This species is the most commonly occurring snail in the Ozarks (Map 21).

Records:

Individual records of the collection sites heretofore listed are not given here because of the great number of sites where this snail was collected. This species is usually abundant wherever it occurs.

BARRY COUNTY: 29543, 32163, 32165, 33764, 35819, 32318;
CAMDEN COUNTY: 33765, 33766, 33767, 36073; **CARTER COUNTY:** 32135, 32572, 33805, 34206, 34208 34211; **CEDAR COUNTY:** 34275, **CHRISTIAN COUNTY:** 35821, 35823, 36495, 36496; **CRAWFORD COUNTY:** 32288, 32289, 32290, 32340, 32341, 32980, 32984, 33027, 33780, 33789, 34139, 34143, 36973, 36977, 36984, 37108; **DADE COUNTY:** 36123, 36125; **DALLAS COUNTY:** 32146, 32147, 33715, 36058, 36061; **DENT COUNTY:** 36140, 36144; **DOUGLAS COUNTY:** 31821, 31824, 31827, 31828, 32757, 32758, 33707, 35815, 35824; **FRANKLIN COUNTY:** 32976; **GASCONADE COUNTY:** 36938, 36944; **GREENE COUNTY:** 35981, 36121; **HICKORY COUNTY:** 37063, 37068, 37071; **HOWELL COUNTY:** 32269, 35971, 35975, 37114, 37116; **IRON COUNTY:** 31837, 32158, 32770, 33794, 34195, 34196, 34243; **JASPER COUNTY:** 29528, 29533, 29548, 32143, 32144; **LACLEDE COUNTY:** 31786, 31818, 33713, 36064, 36067; **LAWRENCE COUNTY:** 32139, 32140; **MCDONALD COUNTY:** 29515, 29517, 29519, 29524, 29525, 32164, 32166, 35817, 36114, 36118, 36120, 40086, 40090, 40094, 40096, 40098, 40109, 40110, 40111, 40113, 40120, 40122, 40124, 40126, 40128, 40129, 40130, 40132, 40134; **MARIES COUNTY:** 34129; **MILLER COUNTY:** 33770, 33772, 33773, 33774; **MORGAN COUNTY:** 33769, 37073; **NEWTON COUNTY:** 29547, 31816, 32167, 40102, 40107, 40116; **OREGON COUNTY:** 31807, 32132, 32133, 32153, 32155, 33019, 33020, 33021, 33728, 33736, 33740, 33762, 34256, 35867, 35877, 35941, 35967, 36034, 36035, 36048, 36056, 36147, 36950, 36958, 36963, 36968; **OZARK COUNTY:** 31801, 31804, 32122, 32123, 32128, 32273, 32752, 32753, 32756, 33709, 37120, 37677, 40141; **PHELPS COUNTY:** 32986, 36494; **POLK COUNTY:** 34264, 34266; **PULASKI COUNTY:** 31819, 32119, 32120, 33029, 33705, 33806, 36465, 36469; **REYNOLDS COUNTY:** 34245, 34246, 34260; **RIPLEY COUNTY:** 32576, 32582, 32584, 32763, 34200, 34253, 36079, 36081, 36085; **ST. CLAIR COUNTY:** 34272, 34273; **ST. FRANCOIS**

COUNTY: 34178; **SHANNON COUNTY:** 32136, 33745, 33758, 33779, 34125, 34135, 34201, 34204, 34205, 35863, 35938, 36075, 36102, 36105, 36529, 36530, 37110; **STONE COUNTY:** 31831, 32142, 32162, 33733, 33762, 35811; **TANEY COUNTY:** 31829, 33710, 33711, 33712, 35799, 35813, 35814; **TEXAS COUNTY:** 32759, 35816; **WASHINGTON COUNTY:** 32981, 32152, 32158, 32267, 32282, 32283, 32285, 32287, 34182, 34183, 34190; **WAYNE COUNTY:** 32281, 33752, 35934, 35936, 35979, 36099; **WEBSTER COUNTY:** 35984, 35986, 35988; **WRIGHT COUNTY:** 35990.

Remarks:

If a permanently flowing stream in the Ozarks contains snails, this species invariably will be present. It is highly variable and, in some spring environments, it may be fairly small and poorly developed. Although Dazo (1965) reported *Elimia livescens* (Menke 1830) from the extreme lower Des Moines River in Iowa. *E. potosiensis* is the only species of the genus known to presently inhabit Missouri.

GENUS *LEPTOXIS* RAFINESQUE 1819

Genus characters:

Shell moderate sized, subglobose with a very short spire to depressed conical; aperture oval to subcircular, base rounded; parietal-columella callously thickened; lateral aspect of outer lip generally straight.

Leptoxis arkansensis (Hinkley 1915)

Common name: Arkansas mudalia

Figures 41-42

Diagnostic characters:

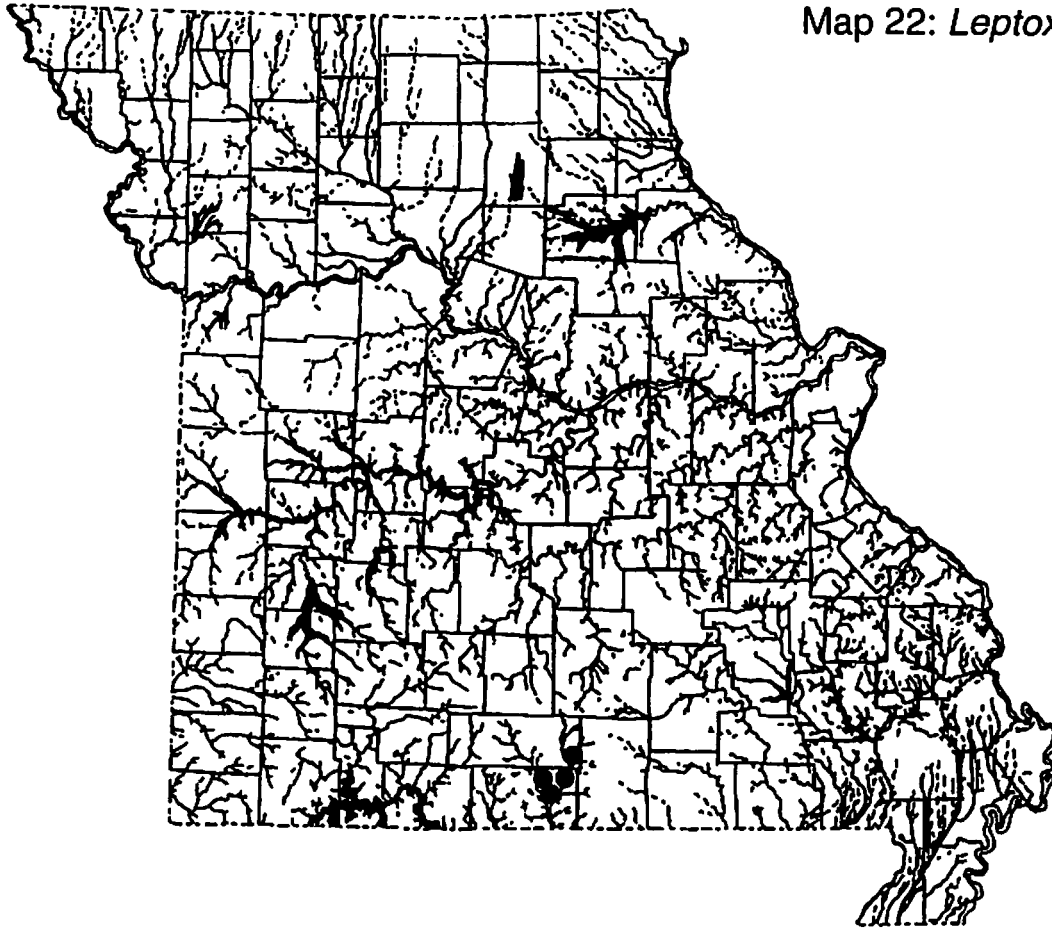
Shell moderately small, to approximately 10mm, conical with depressed spire (specimens with eroded spires may appear ovate to subglobose), color uniform to variably banded.

Distribution in Missouri:

Restricted to the drainage system of the North Fork of the White River in central southern Missouri (Map 22).

Records:

DOUGLAS COUNTY: 31822-SPRING CREEK @ MO Hwy 14, T25NR11W Sec 27; 31825-NORTH FORK OF WHITE RIVER (NFWR) @ HEBRON ACCESS, T25NR11W Sec 18; **OZARK COUNTY:** 31802 & 32754-BRYANT CREEK @ MO Hwy 181,



Map 22: *Leptoxis arkansensis*
(Hinkley)

T24NR12W Sec 34; 31805, 31814 & 40142-(NFWR) @ CO Hwy H, T23NR11/12W Sec 25/30; 32129-SPRING CREEK, T24NR11W Sec 33.

Remarks:

This is the only species of *Leptoxis* known to occur west of the Mississippi River. Most of its populations in Arkansas appear to have been extirpated.

GENUS *PLEUROCERA* RAFINESQUE 1818

Genus characters:

Shell moderate to large, typically conically elongated; aperture moderate in size, subrhomboidal, base prolonged into a short canal; parietal wall without callus; columella smooth, twisted, not callously thickened; outer lip somewhat expanded, lateral aspect sinuous.

***Pleurocera acuta* Rafinesque 1831**

Common name: sharp hornsnail

Figures 43-44

Diagnostic characters:

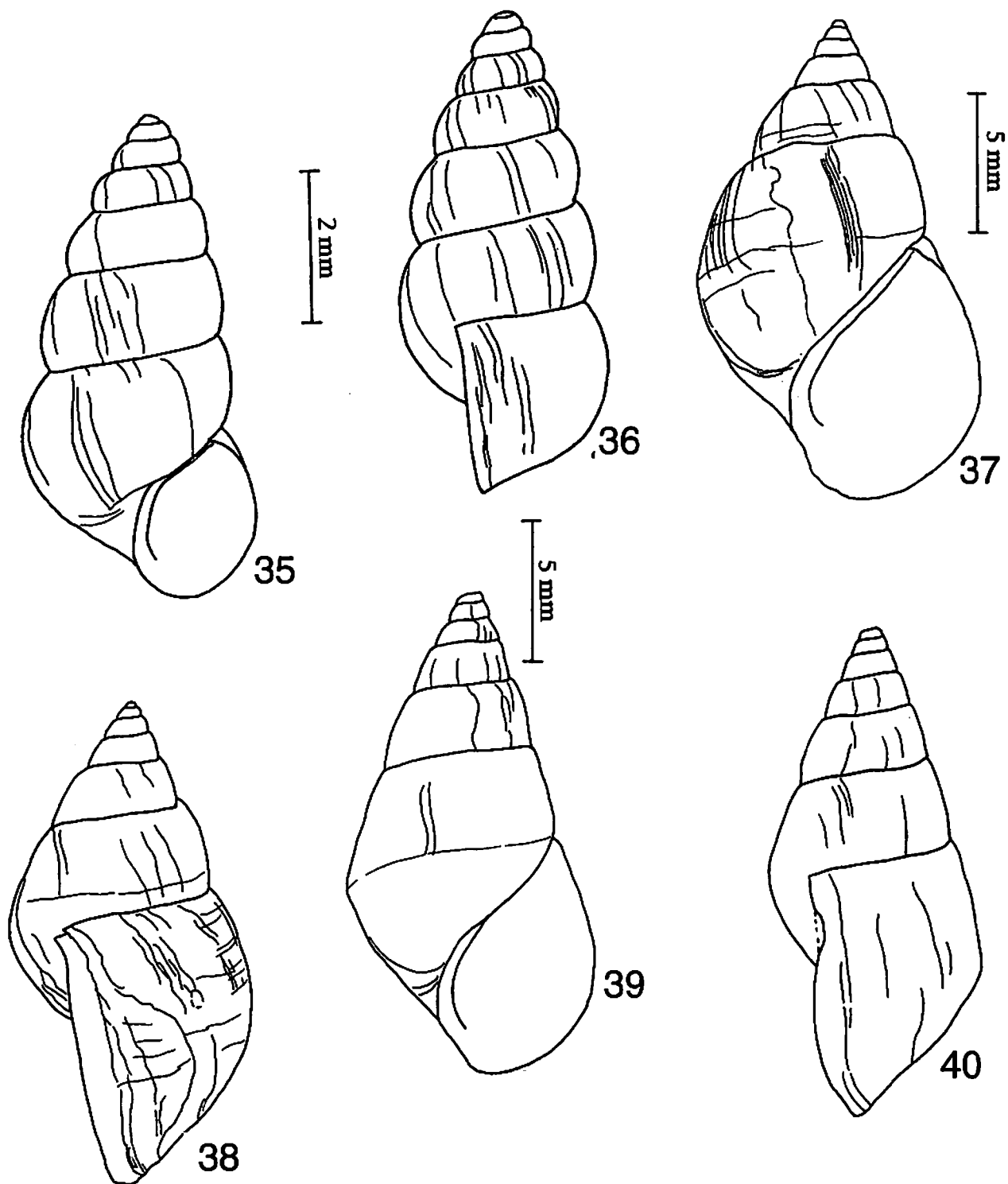
Shell tall and fairly narrow, whorls rather flat to slightly convex, some populations with a single carina on whorls, color uniform to variably banded; aperture about 2/3 of the length of body whorl.

Distribution in Missouri:

Fairly common in streams of the Ozark Plateaus. Also found in the Mississippi River and some of its tributaries in northeastern Missouri (Map 23).

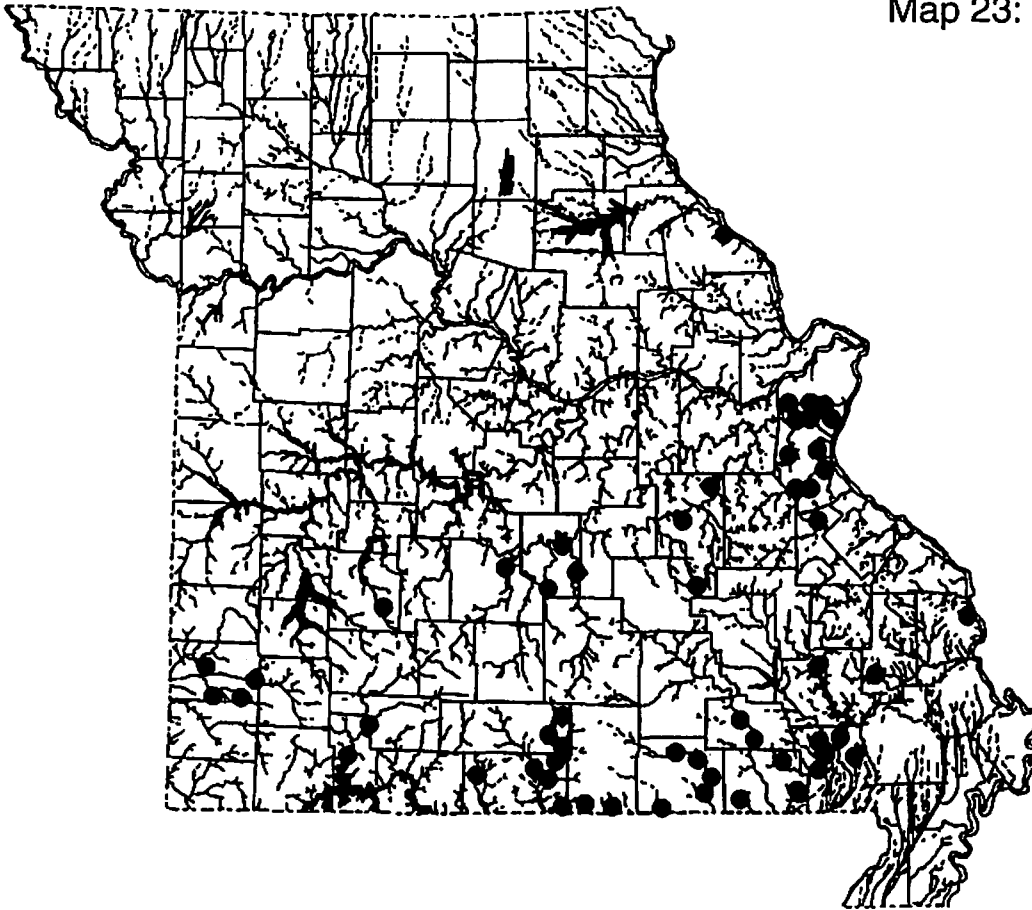
Records:

BOLLINGER COUNTY: 32150-CASTOR RIVER @ ZALMA, T29NR09E Sec 29; **BUTLER COUNTY:** 32268-CANE CREEK (CC) @ CO Hwy PP, T25NR05E Sec 21; 32588-(CC) @ U.S. Hwys 67/160, T24NR05E Sec 36; 35950-(CC) @ CO Hwy M, T24NR05E Sec 15; (UMMZ) 39331 & 40201-BUTLER CO.; **CAPE GIRARDEAU COUNTY:** 31836-MISSISSIPPI RIVER @ TRAIL OF TEARS STATE PARK; **CARTER COUNTY:** 32571-CURRENT RIVER @ BIG SPRING STATE PARK; (UMMZ) 40209-CARTER CO.; **CRAWFORD COUNTY:** 32550-MERAMEC RIVER (MR), T40NR02W Sec 24 C; 36983-(MR) @ BIRDS NEST, T38NR04W Sec 21; 37109-(MR) @ Hwy 19 BRIDGE, 1 MI NW OF



Figs. 35-40: Shells of the Family Pomatiopsidae. FIGS. 35-36. *Pomatiopsis lapidaria* (Say): Apertural and right-side views. UCM 38639. Shell length 7mm, whorls 6 1/4. FIGS. 37-40. Shells of the Family Pleuroceridae. FIGS. 37-38. *Elimia potosiensis* (Lea): Apertural and right-side views. UCM 32165. Shell length 17.6mm. FIGS. 39-40. *Elimia potosiensis* (Lea): Apertural and right-side views. UCM 32773. Shell length 17.6 + mm, (apex broken).

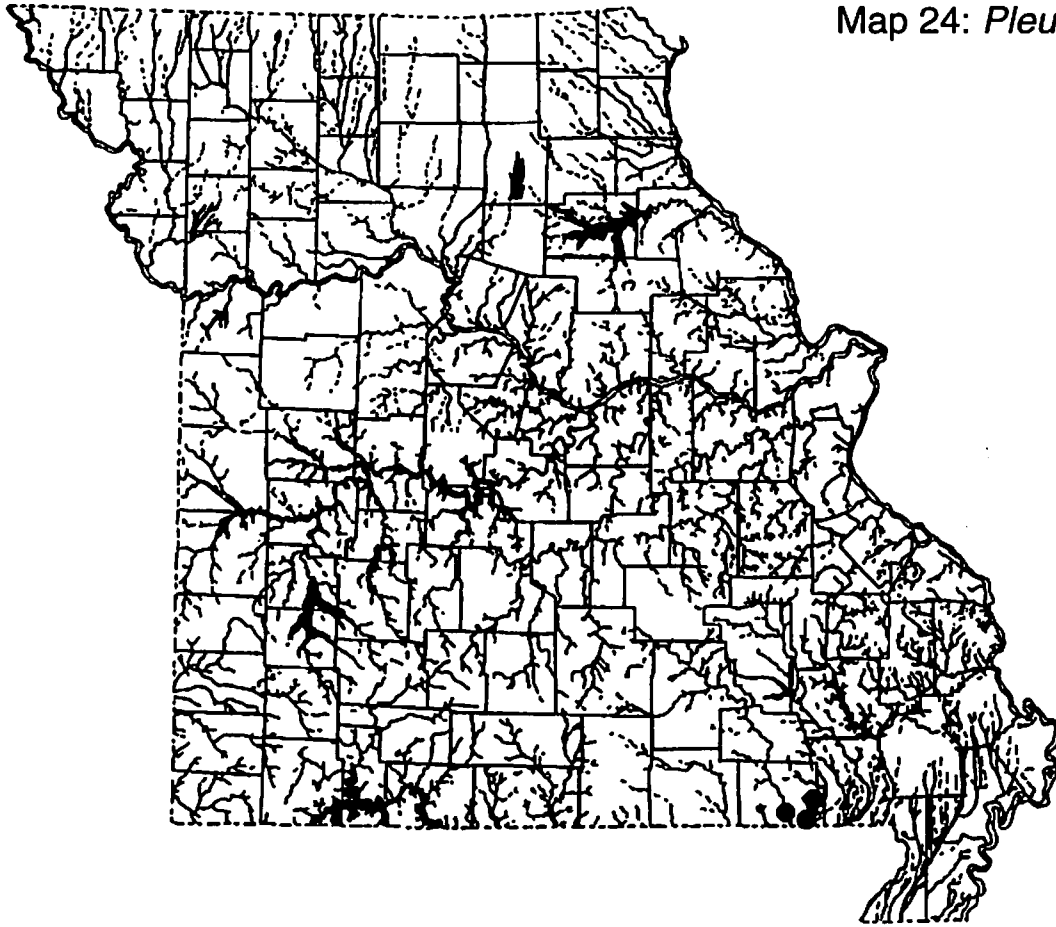
Map 23: *Pleurocera acuta*
Rafinesque



STEELVILLE; **DENT COUNTY:** 32156-EAST FORK OF HUZAZH CREEK, T34NR02W Sec 18; **DOUGLAS COUNTY:** 31820-SPRING CREEK @ MO Hwy 14, T25NR11W Sec 27; 31823-NORTH FORK OF WHITE RIVER @ HEBRON ACCESS, T25NR11W Sec 18; 31826-INDIAN CREEK @ MO Hwy 76, T26NR11W Sec 33; **GREENE COUNTY:** (UMMZ) 39333-GREENE Co; **HENRY COUNTY:** UMMZ 89752 & 89753-HENRY COUNTY; **HOWELL COUNTY:** 35976-BENNETT RIVER @ MO Hwy 142, T21NR10W Sec 02; 35972-SOUTH FORK OF SPRING RIVER, T21NR08W Sec 05 EC; 37115-SPRING RIVER @ MO Hwy 142, T21NR08W Sec 05; **JASPER COUNTY:** 29539-CENTER CREEK @ CO Hwy HH, T28NR32W Sec 12/24; 29541-CENTER CREEK @ MO Hwy 37, T27NR30W Sec 12; 29551-SPRING RIVER @ CO Hwy U, T28NR29W Sec 11; 29552-SPRING RIVER @ CO Hwy D, T29NR32W Sec 17; **JEFFERSON COUNTY:** 36014-BIG RIVER @ MORSE MILL ACCESS, T41NR03E Surv 1972; 32159-JOACHIM CREEK @ MO Hwy 110, T40NR04E Surv 1232; 31798-MERAMEC RIVER (MR), T43NR04E Sec 05; 33775-(MR), T34NR03E Sec 12 NE4; (UMMZ) 39334, 40207 & 40208-JEFFERSON CO.; **LACLEDE COUNTY:** 31817-GASCONADE RIVER @ HAZELGREEN ACCESS, T35NR14W Sec 15; **OREGON COUNTY:** 31806, 31812, 34255, 35868 & 36055-ELEVEN POINT RIVER (EPR) @ U.S.Hwy 160, T23NR02W Sec

17; 32131, & 36148-(EPR) @ MO Hwy 19, T25NR03/04W Sec 31/36; 35878-(EPR), T23NR02W Sec 21 SE4NW4; 35944-(EPR), T23NR02W Sec 34 SW4SE4; 36049-(EPR), T24NR02W Sec 32 SE4SE4; 36949-(EPR), T25NR03W Sec 31 SW4; 36954-(EPR), T24NR03W Sec 02 SC; 36957-(EPR), T24NR03W Sec 11 SE4; 36962-(EPR), T24NR02W Sec 18 C; 36967-(EPR) @ WHITES CREEK, T24NR02W Sec 20; 35968-SPRING RIVER, T21NR05W Sec 05 SE4; 33727 & 33759-SPRING RIVER IN THAYER, T22NR05W Sec 32; 33735-TWO MILE CREEK, T22NR05W Sec 30 NW4NW4; **OZARK COUNTY:** 32272 & 37119-BENNETT BAYOU @ MO Hwy 142, T21NR11W Sec 02; 31800 & 32755-BRYANT CREEK @ MO Hwy 181, T24NR12W Sec 34; 31803, 31813 & 37678-NORTH FORK OF WHITE RIVER (NFWR) @ CO Hwy H, T23NR11/12W Sec 25/30; 33708-(NFWR), T23NR15W Sec 33 NW4SE4; 32127-NORTH FORK SPRING, T24NR11W Sec 33; 40140-NORTH FORK OF WHITE RIVER @ CO Hwy H; **PIKE COUNTY:** 37080-MISSISSIPPI RIVER, T54NR01W Sec 12 NE4; **PULASKI COUNTY:** 32118-BIG PINEY RIVER; 36466-GASCONADE RIVER, T37NR11W Sec 34 C; 33704-ROUBIDOUX CREEK IN FORT LEONARD WOOD, T34NR12W Sec 11 NE4SE4; **RIPLEY COUNTY:** 32575-FOURCHE CREEK @ MO Hwy 142, T22/23NR01E Sec 02/35; 34214-LITTLE BLACK RIVER (LBR) @ CO Hwy K, T24NR03E Sec 09/10; 35955-(LBR) IN MUD PUPPY

Map 24: *Pleurocera alveare*
(Conrad)



WILDLIFE AREA, T24NR03E Sec 23; 36096-TURKEYPEN HOLLOW CREEK, T22NR03E Sec 14; ST. FRANCOIS COUNTY: 32760-COONVILLE FEN IN ST. FRANCIS STATE PARK, T38NR05E Sec 19; ST. LOUIS COUNTY: 32563-MERAMEC RIVER (MR), T44NR03E Sec 25 E2; 34278-(MR), T43NR03E Surv 1891 WC; 34284-(MR) T43NR04E Sec 05 EC; (UMMZ) 39335, 39336, 39337, 39338, 39339, 40205 & 40206-ST. LOUIS COUNTY; STONE COUNTY: 31830-JAMES RIVER @ HOOTENTOWN ACCESS, T26NR22W Sec 19; (UMMZ) 39332-STONE CO.; WAYNE COUNTY: 34232-BIG CREEK IN SAM BAKER STATE PARK, T30NR05E Sec 28; 32570-BLACK RIVER @ BIG SPRING STATE PARK, T27NR04E Sec 23.

Remarks:

Pleurocera acuta is widespread throughout much of the Interior Basin and the Great Lakes/St. Lawrence drainage (see Dazo, (1965). It may represent a group of closely related species rather than a single taxon.

***Pleurocera alveare* (Conrad 1834)**

Common name: rough hornsnail

Figures 45-46

Diagnostic characters:

Shell conical, rather heavy, whorls flattened, relatively heavily sculptured, body whorl with a knobby carina, base of body whorl spirally striated, upper whorls may be knobby adjacent to sutures, vertical costae may be present, color uniform; aperture approximately a third of shell height.

Distribution in Missouri:

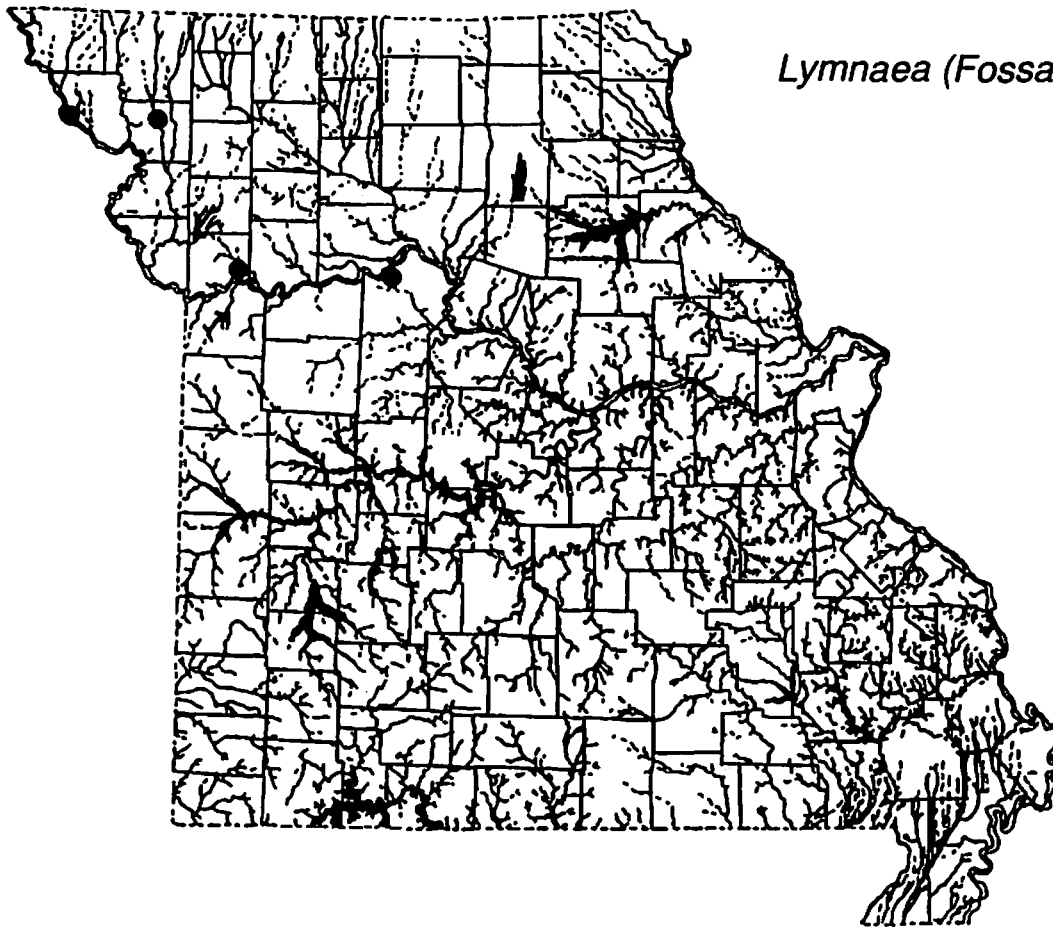
Only known from the lower Current River (Map 24).

Records:

RIPLEY COUNTY: (UMMZ) 55830, 182447 & 504445-CURRENT RIVER.

Remarks:

Pleurocera alveare is the only highly sculptured pleurocerid to occur in Missouri. This species is a faunal component of the Ohio River basin and occurs west of the present channel of the Mississippi River due to prehistoric drainage patterns of the lower Ohio River. It still occurs in portions of the Black River system in Arkansas but has been extirpated from much of the rest of its former range.



Map 25:
Lymnaea (Fossaria) bulimoides
Lea

SUBCLASS PULMONATA
ORDER LYMNOPHILA

FAMILY LYMNAEIDAE
RAFINESQUE 1815

Family characters:

Shell dextral, small to large in size, ovate or elongated; thin, fragile or solid; surface with or without spiral striae or regularly spaced short axial lines; usually light horn in color. Spire more or less attenuated or acutely conic; whorls shouldered, rounded or flattened; suture shallow or impressed; body whorl smooth or malleated. Aperture subovate to ovate; outer margin simple, rounded or straight, columellar margin normally reflected over umbilicus; columellar and parietal margins more or less continuous or plaited. With or without umbilicus.

GENUS *LYMNAEA* LAMARCK 1799

Genus characters:

Same as that of the family.

SUBGENUS *FOSSARIA* WESTERLUND 1885

These species are the smaller *Lymnaea*; shell usually pointed and turreted, axis smooth, not twisted, round and inner lip reflected forming a somewhat triangular expansion, umbilical chink may be narrowly open or quite deep and round; radula with distinct tricuspid lateral teeth (from Baker, 1928).

Lymnaea (Fossaria) bulimoides Lea 1841

Common name: prairie fossaria

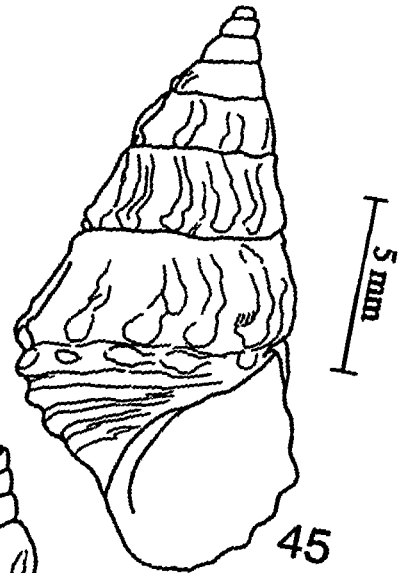
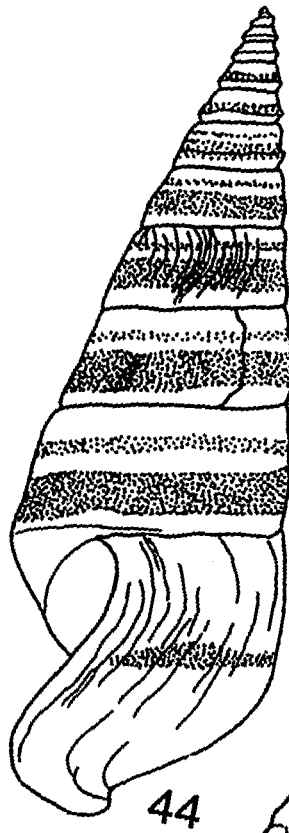
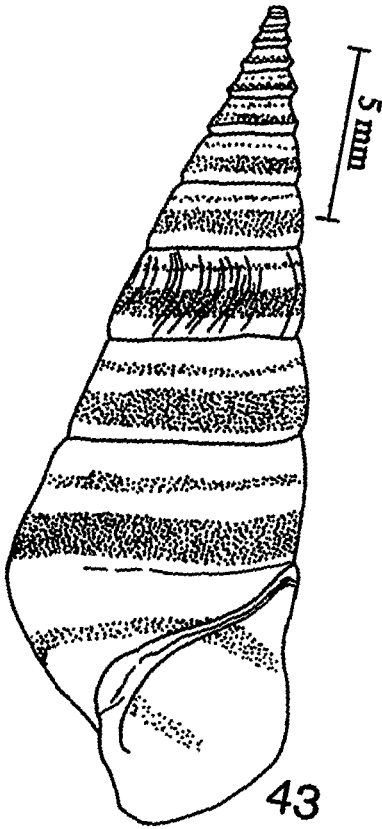
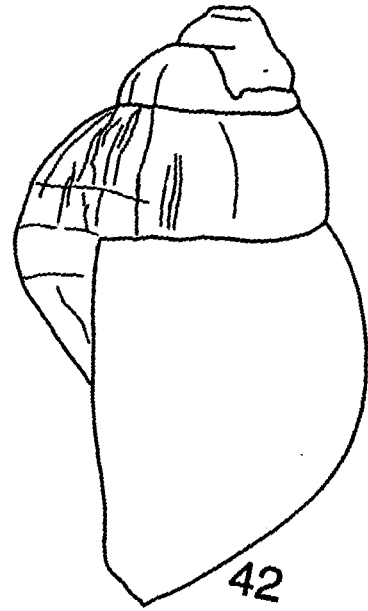
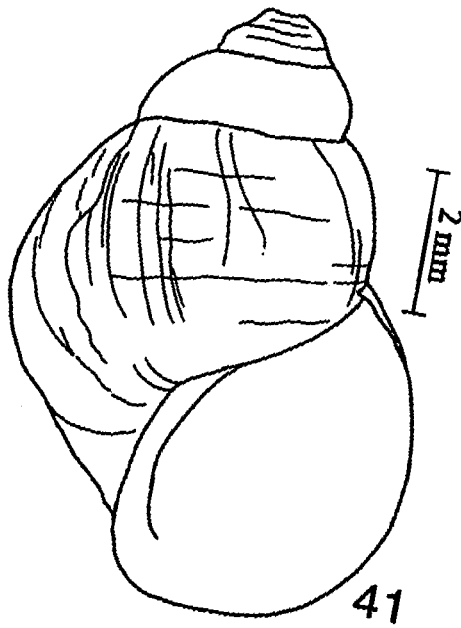
Figure 47

Diagnostic characters:

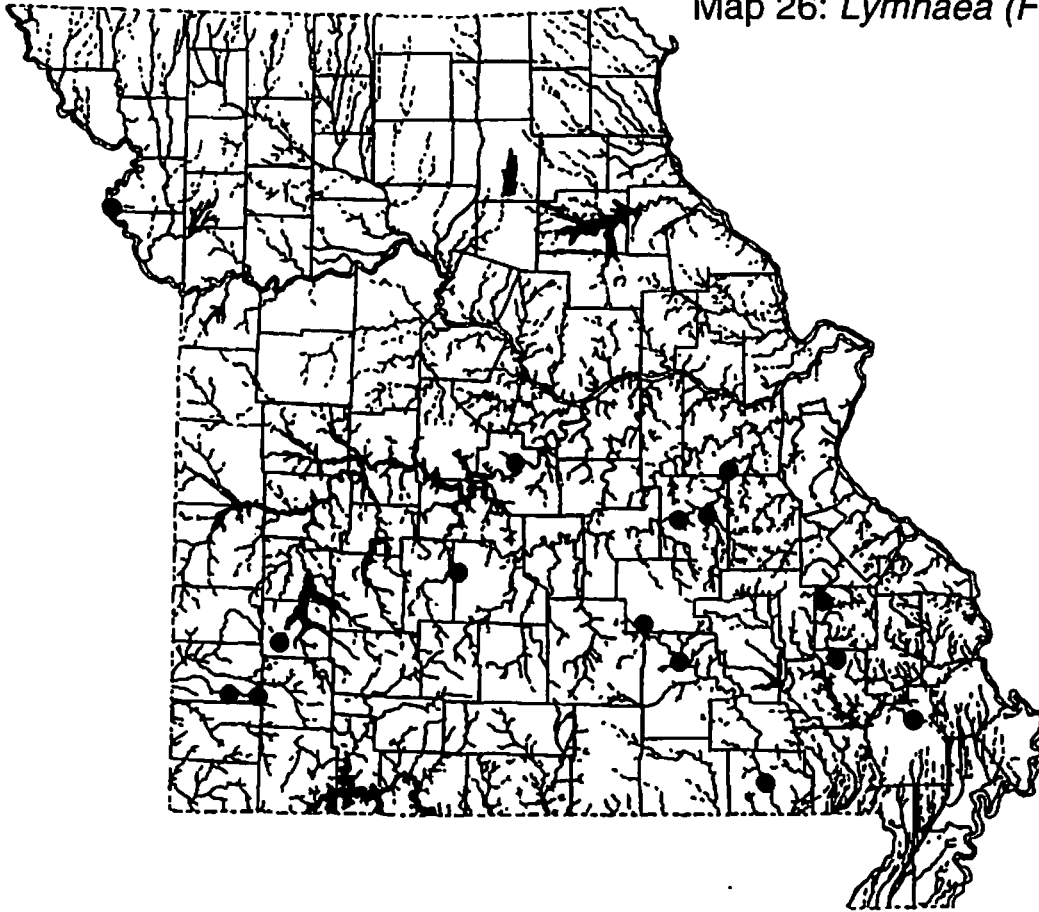
Shell medium sized, rather solid, ovate or globose form, surface smooth, dull to shining. Spire conical, body whorls large and ventricose, aperture round ovate, inner margin broadly and flatly expanded and reflected over umbilicus.

Distribution in Missouri:

Found only from the Upper and Lower Missouri divisions of the Prairie Region (Map 25).



Map 26: *Lymnaea (Fossaria) humilis*
Say



Records:

ANDREW COUNTY: 32556-ROADSIDE POOL @ MO Hwy 48, T60NR35W Sec 35S/10N; **CLAY COUNTY:** 35855-COOLEY LAKE WILDLIFE AREA, (POOLS B&D) T51NR30W Sec 02 SE4; **HOLT COUNTY:** 36795-ROADSIDE MARSH @ U.S. Hwy 159, T61NR40W Sec 33 NE4; **SALINE COUNTY:** 36862-GRAND PASS WILDLIFE AREA, T52NR22W Sec 21 EC.

Lymnaea (Fossaria) humilis Say 1822

Common name: marsh fossaria

Figures 48-49

Diagnostic characters:

Shell small, elongate conic, fragile to rather solid.
Spire attenuated conic, slightly longer than the

apertural length; body whorl rounded. Aperture ovate, outer margin simple, inner columellar margin reflected and slightly plaited.

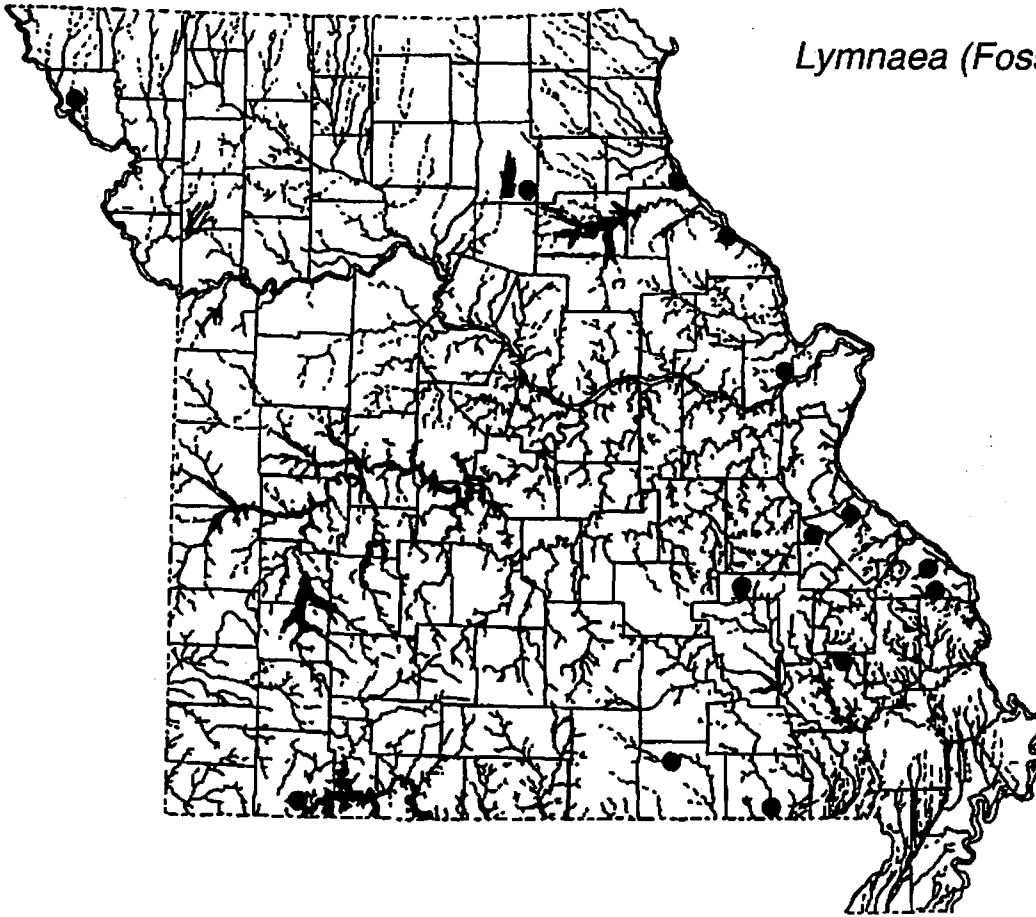
Distribution in Missouri:

Widely distributed in the Ozark Region. Found in one locality each from the Prairie and Lowland Regions (Map 26).

Records:

BUCHANAN COUNTY: 35848-SUGAR LAKE IN LEWIS AND CLARK STATE PARK, T55NR37W Sec 34 NW4; **CRAWFORD COUNTY:** 37730-HUZZAH WILDLIFE AREA, T38NR03W Sec 12 NE4NW4; 37856-HUZZAH CREEK, T38NR03W Sec 23 NW4NW4; 37105-MERAMEC RIVER, T38NR04W Sec 29 NE4NE4; **DADE COUNTY:** 36127-SANS CREEK, T30/31NR27W Sec 05 NC/32 SC; **DENT COUNTY:** 37997-CURRENT RIVER, T32NR06W Sec 31 SW4NE4; **FRANKLIN COUNTY:** 37978-MERAMEC STATE PARK, T40NR01W Sec 06 SE4NE4; **JASPER COUNTY:** 29530-CENTER CREEK @ LOOP I-44, T27NR29W Sec 09 S; 29535-CENTER CREEK @ ALT U.S. Hwy 71, T28NR31W Sec 33/34; **LACLEDE COUNTY:** 38109-BENNETT SPRING STATE PARK, T35NR17W Sec 31 SW4 CN; **MADISON**

Figs. 41-46. Shells of the Family Pleuroceridae. FIGS. 41-42. *Leptoxis arkansensis* (Hinkley): Apertural and right-side views. UCM 32165. Shell length 8.8mm, (apex broken and eroded). FIGS. 43-44. *Pleurocera acuta* Rafinesque: Apertural and right-side views. UCM 36968. Shell length 24.3mm, (apex slightly broken). FIGS. 45-46. *Pleurocera alveare* (Conrad): Apertural and right-side views. UMMZ 182447. Shell length 16.8mm (apex slightly broken).



Map 27:
Lymnaea (Fossaria) modicella
Say

COUNTY: 37161-ST. FRANCIS RIVER, T33NR05E Sec 12 SE4;
MILLER COUNTY: 37701-SALINE VALLEY WILDLIFE AREA,
T41NR13W Sec 29 NW4; **RIPLEY COUNTY:** 34248-WELLS
BRANCH FEN T23NR02E Sec 07 NW4; **SHANNON COUNTY:**
37122-CURRENT RIVER T30NR04W Sec 20 NW4SE4;
STODDARD COUNTY: 36986-POPLAR CREEK @ CO Hwy AB,
T26NR11E Sec 03 NE4SE4.

Lymnaea (Fossaria) modicella Say 1825

Common name: rock fossaria

Figures 50-51

Diagnostic characters:

Shell medium sized, (shell length 9.7mm with 5.5 whorls), elongate-ovate or fusiform, surface dull. Spire elongate conical; body whorls shouldered. Aperture ovate, shorter than half that of shell length; outer margin simple, columellar margin almost straight and reflected over umbilicus and connected to the parietal callus.

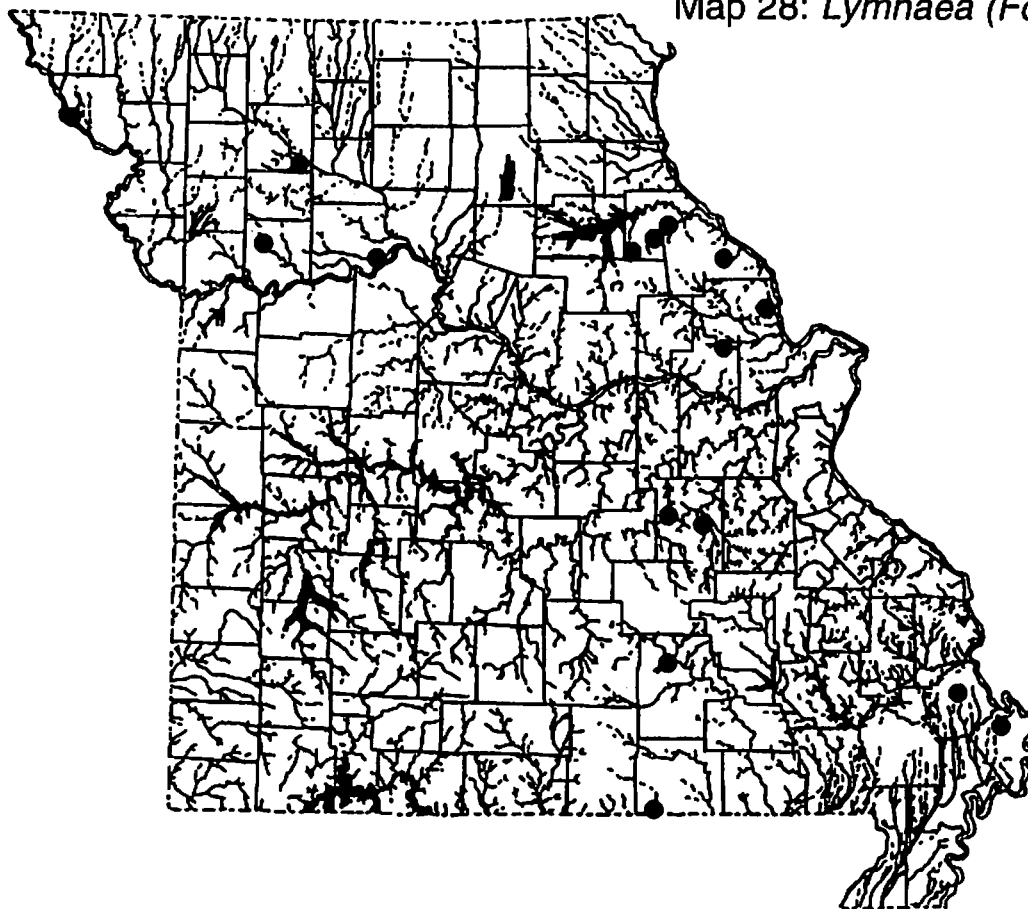
Distribution in Missouri:

Found in the Ozark and Prairie Regions (Map 27).

Records:

BARRY COUNTY: 29544-ROARING RIVER STATE PARK BESIDE PARK OFFICE, T22NR27W Sec 27 EC; **HOLT COUNTY:** 36684-EAGLE POOL IN SQUAW CREEK NATIONAL WILDLIFE REFUGE; **IRON COUNTY:** 33796-UNNAMED FEN ALONG GRAVEL ROAD, T34NR01W Sec 07 SE4; **MACON COUNTY:** 32439-ROADSIDE DITCH @ U.S. Hwy 36, T57NR14W; **MARION COUNTY:** 32429-ROADSIDE DITCH, @ U.S. Hwy 24, T57NR04W; **OREGON COUNTY:** 38920-ONYX CAVE, T24NR04W Sec 06; **PERRY COUNTY:** 32809-CITY PARK CAVE, T35NR11E Sec 20; 36032-UIPUL CREEK @ U.S. Hwy 61, T34NR12E Sec 20 SE4; **PIKE COUNTY:** 37099-MISSISSIPPI RIVER, T54NR01W Sec 36 NE4NW4; **RIPLEY COUNTY:** 36086-CURRENT RIVER, T22NR02E Sec 25 SW4NE4; **ST. CHARLES COUNTY:** 36524-LAKE 16 IN BUSCH WILDLIFE AREA; **ST. FRANCOIS COUNTY:** 34175-FLAT RIVER @ MO Hwy 32, T36NR04E Sec 13; **ST. LOUIS COUNTY:** 32782-DAVIDS SPRING, T44NR05E Sec 09 NE4; **STE. GENEVIEVE COUNTY:** 36039-ESTABLISHMENT CREEK @ U.S. Hwy 61, T38NR07E Sec 13; **WAYNE COUNTY:** 36101-CEDAR CREEK @ U.S. Hwy 67, T30NR06E Sec 06.

Map 28: *Lymnaea (Fossaria) obrussa*
Say



Lymnaea (Fossaria) obrussa Say 1825

Common name: golden fossaria

Figures 52-53

Diagnostic characters:

Shell medium sized (shell length 15mm with 6 5/8 whorls; 7.8mm with 5.5 whorls), elongate conic, rather solid, surface with coarse sinuated lines. Whorls very convex and the suture is impressed. Body whorl surface often malleated. Aperture elongate-ovate, half of the shell length; outer margin simple and shouldered, columellar margin slightly reflected over umbilicus and twisted.

Distribution in Missouri:

Found in the Mississippi and Upper Missouri divisions of the Prairie Region; the Black and Mississippi divisions of the Ozark Region; and in the Lowland Region (Map 28).

Records:

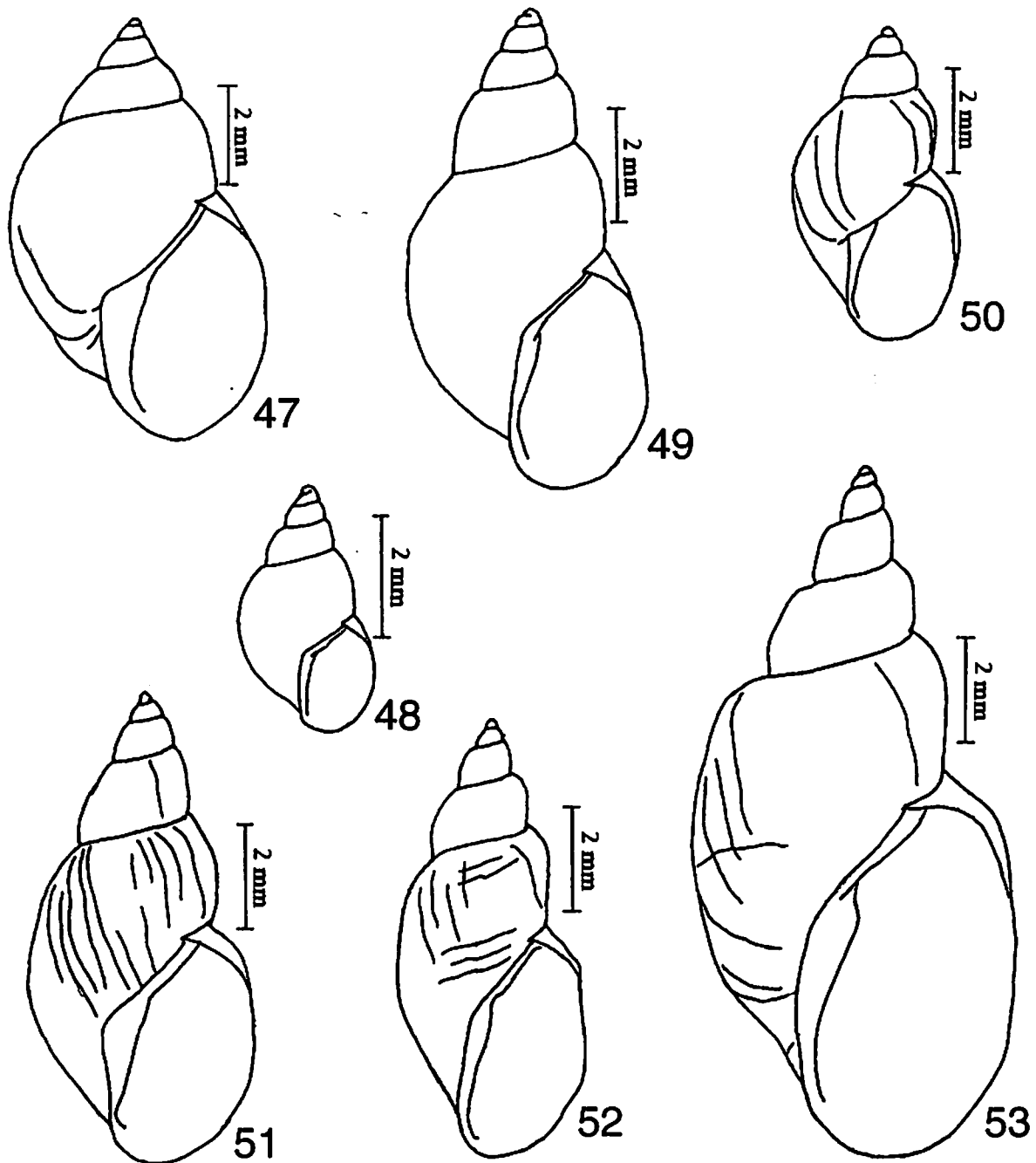
CARROLL COUNTY: 36865-ROADSIDE DITCH @ MO Hwy 41, T52NR21W Sec 03 NE4NE4; CRAWFORD COUNTY: 34145-

HUZZAH CREEK, T38NR03W Sec 23 ; 36979-MERAMEC RIVER, T38NR04W Sec 18 C; DAVIESS COUNTY: 37198-POND IN HOLMES BEND ACCESS, T59NR27W Sec 28 SE4NE4; HOLT COUNTY: 35842-BIG LAKE STATE PARK, T61NR40W Sec 19 C; LINCOLN COUNTY: 35801 & 35836-B.K. LEACH WILDLIFE AREA, T50NR03E Surv 1693 EC; MISSISSIPPI COUNTY: 33820-UPPER BIG LAKE, T27NR16E Sec 30 SW4NW4; OREGON COUNTY: 33730 & 33742-WARM FORK IN THAYER, T22NR05W Sec 32; PIKE COUNTY: 36519-RAMSEY CREEK @ CO Hwys D & WW, T52NR01W Surv 1762; RALLS COUNTY: 36503-LICK CREEK @ CO Hwy D, T53NR07W Sec 22; 36506-SINKHOLE POND BESIDE CHURCH @ CO Hwys D & JJ, T54NR06W Sec 34 EC; 36510-JUG RUN CREEK, T54NR05W Sec 08 NE4; RAY COUNTY: 35862-OXBOW LAKE IN CROOKED CREEK WILDLIFE AREA, T53NR28W Sec 16 W2; SCOTT COUNTY: 33823-DITCH CROSSING I-55, T28NR14E Surv 1014; SHANNON COUNTY: 34137-ROUND SPRING BRANCH, T30NR04W Sec 20 NW4; WARREN COUNTY: 36486-INDIAN CAMP CREEK, T47NR01W Sec 04 NE4.

Lymnaea (Fossaria) parva Lea 1841

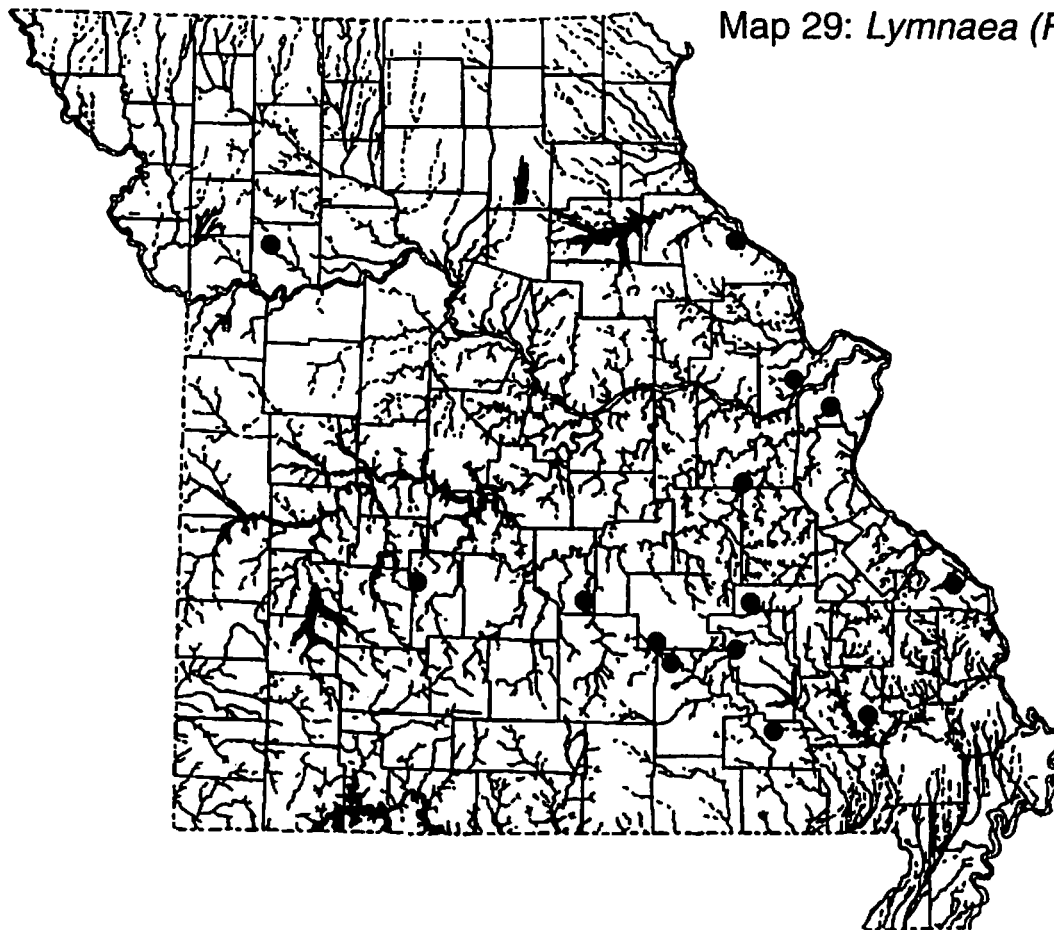
Common name: pygmy fossaria

Figure 54



FIGS. 47-53. Shells of Family Lymnaeidae FIG. 47. *Lymnaea (Fossaria) bulimoides* Lea: Apertural view. UCM 36795. Shell length 9.5mm, 5 1/2 whorls. FIG. 48. *Lymnaea (Fossaria) humilis* Say: Apertural view. UCM 37701. Shell length 4.4mm, 4 7/8 whorls. FIG. 49. *Lymnaea (Fossaria) humilis* Say: Apertural view. UCM 37701. Shell length 8.5mm, 5 3/4 whorls. FIG. 50. *Lymnaea (Fossaria) modicella* Say: Apertural view. UCM 29544. Shell length 5.9mm, 4 1/2 whorls. FIG. 51. *Lymnaea (Fossaria) modicella* Say: Apertural view. UCM 29544. Shell length 9.7mm, 5 1/2 whorls. FIG. 52. *Lymnaea (Fossaria) obrussa* Say: Apertural view. UCM 34145. Shell length 8.8mm, 5 1/4 whorls. FIG. 53. *Lymnaea (Fossaria) obrussa* Say. Apertural view. UCM 33742. Shell length 15mm, 6 5/8 whorls.

Map 29: *Lymnaea (Fossaria) parva*
Lea



Diagnostic characters:

Shell small, usually 6mm or less in shell length, surface rough, fragile and shining. Spire conical, whorls 5.25, turreted and convex; suture well impressed. Body whorl globose. Aperture round or subovate, columellar margin reflected, umbilicus distinct.

Distribution in Missouri:

Found in the Ozark Region and in 4 localities from the Prairie Region (Map 29).

Records:

CARTER COUNTY: 32772-MUTTON HOLLOW FEN @ U.S. Hwy 60, T27NR01E Sec 02; **DENT COUNTY:** 38012-CURRENT RIVER, T32NR07W Sec 36 NE4NW4; **FRANKLIN COUNTY:** 37501-MERAMEC STATE PARK, T40NR02W Sec 02 SE4NE4; **IRON COUNTY:** 32766-BARTON FEN, T34NR01W Sec 17; **LACLEDE COUNTY:** 38148-HANGING FEN IN BENNETT SPRING STATE PARK 35NR18W Sec 31 SW4SW4; **PERRY COUNTY:** 32795-SOEHL CAVE, T34NR12E Sec 04; **PIKE COUNTY:** 34199-CLINTON SPRING @ MO Hwy 79, T54NR01W Sec 20; **PULASKI COUNTY:** 38082-BIG PINEY RIVER, T35NR10W Sec 29 SW4; **RAY COUNTY:** 35862-OXBOW LAKE

IN CROOKED CREEK WILDLIFE AREA, T53NR28W Sec 16 W2. **REYNOLDS COUNTY:** 33014-GRASSHOPPER FEN, T32NR01W Sec 30 SC; 33803-GRASSHOPPER CREEK, T32NR01W Sec 30; **ST. CHARLES COUNTY:** 36526-PITZMAN LAKE IN BUSCH WILDLIFE AREA, **ST. LOUIS COUNTY:** 34221-DAVIDS SPRING WEST END OF RR CUT, T44NR05E Sec 09 NE4; 34217-DITCH ALONG RR, T44NR05E Sec 09 NE4; **SHANNON COUNTY:** 38041-MEDLOCK CAVE, T31NR06W Sec 10; **WAYNE COUNTY:** 34287-UNNAMED FEN, T27NR07W Sec 03 WC.

Subgenus *Stagnicola* Leach (in Jeffreys) 1830

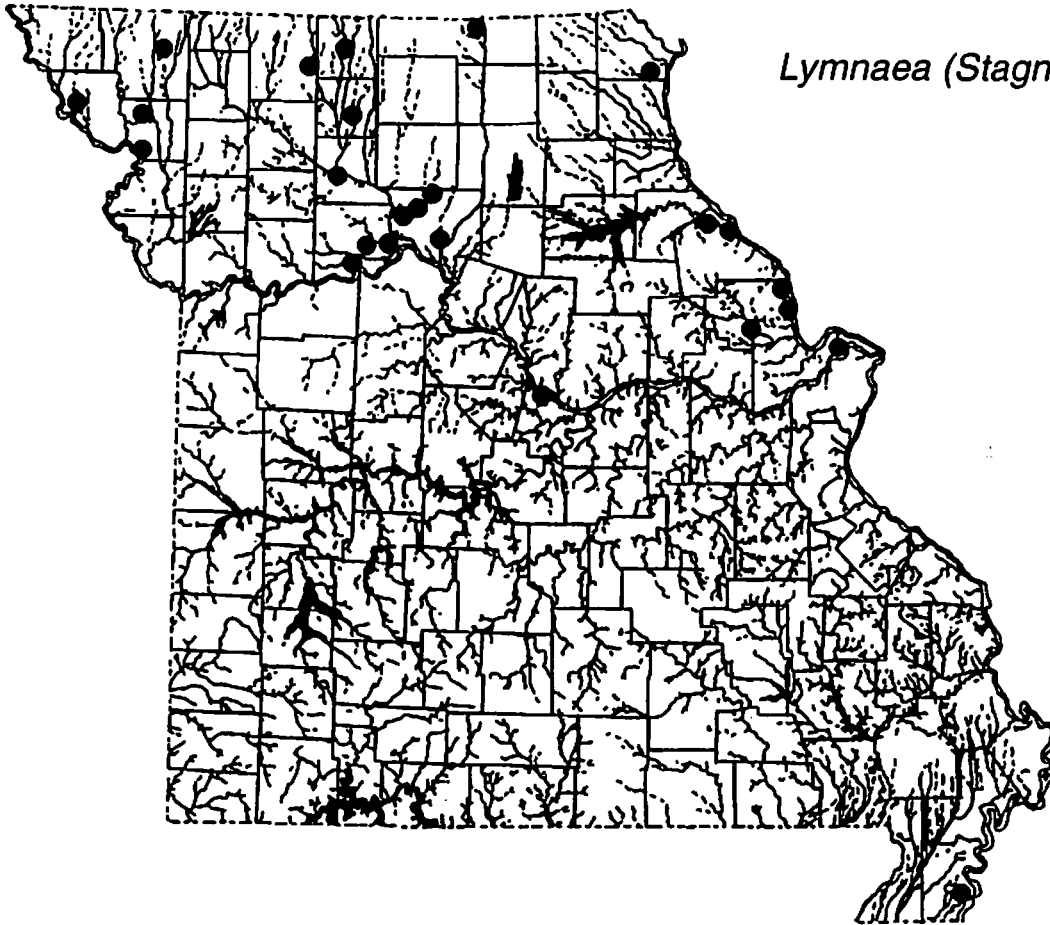
These species are the larger *Lymnaea*; shells are distinctly sculptured by longitudinal and spiral lines; columella with a plait or fold, axis twisted; outer lip with a heavy internal varicose thickening; radular teeth with bicuspid lateral and distinctly tricuspid intermediate teeth.

***Lymnaea (Stagnicola) caperata* Say 1829**

Common name: wrinkled marshsnail

Figure 55

Map 30:
Lymnaea (Stagnicola) caperata
Say



Diagnostic characters:

Shell small to medium, moderately thick, light horn to black color, surface usually with coarse spiral striae supporting raised periostracal hairs. Spire length almost 2.5 times apertural length, narrowly conic. Body whorl large but not ventricose. Aperture subovate, columellar margin reflected and twisted or straight.

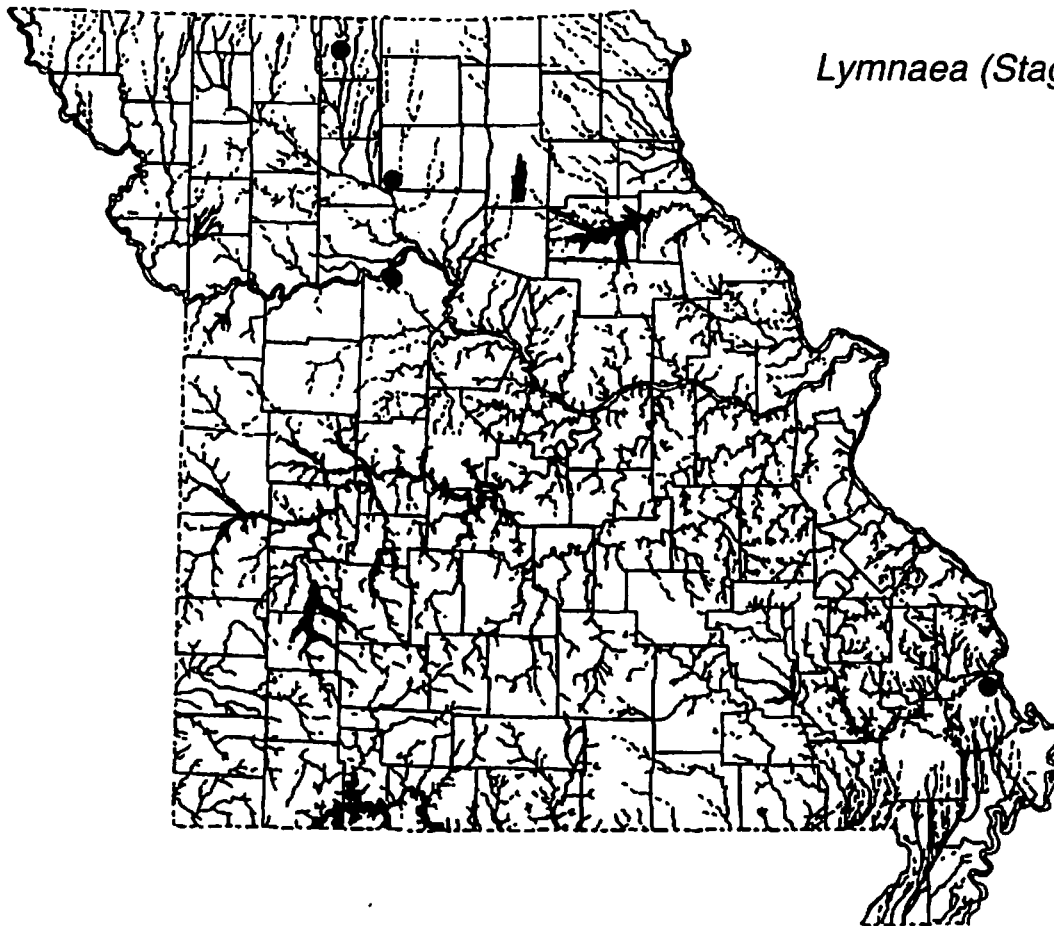
Distribution in Missouri:

Found in the Mississippi, Lower and Upper Missouri divisions of the Prairie Region, and the Lowland Region (Map 30).

Records:

ANDREW COUNTY: 32312-NODAWAY ISLAND ACCESS, T58NR36W Sec 26 N2; 32557-ROADSIDE POOL @ CO Hwy C, T60NR35W Sec 35 S/10 N; **BOONE COUNTY:** 32995-BORROW PIT BETWEEN GRAVEL ROAD & RR, T45NR12W Sec 16 SW4; **CARROLL COUNTY:** 36475-ROADSIDE DITCH @ U.S. Hwy 65, T52NR23W Sec 17 NE4; 36480-CATTAIL BORROW PIT, T53NR23W Sec 34 SW4; 36483-BIG CREEK @ THE MIDDLE BRIDGE, @ U.S. Hwy 139, T53NR22W Sec 13/14; **CHARITON COUNTY:** 35839-ROADSIDE POOL @ CO Hwy CC, T55NR20W

Sec 03 SE4; 36887-YELLOW CREEK WILDLIFE AREA, T55NR21W Sec 14 NW4NW4; 36868-NANNIE B. FLOYD WILDLIFE AREA, T56NR19W Sec 20 NC; 36872-ROADSIDE POOL @ MO Hwy 05, T54/55NR18W Sec 33 SE4SW4; **CLARK COUNTY:** 36887-BUCK RUN WILDLIFE AREA, T63NR06W Sec 14 NC; **GRUNDY COUNTY:** 32333-ROADSIDE POOL @ MO Hwy 06, T61NR24W Sec 13 SC; **HARRISON COUNTY:** 32325-POOL N OF U.S. Hwy 136, T64NR26W Sec 23 NE4; **HOLT COUNTY:** 36700-SQUAW CREEK NATIONAL WILDLIFE REFUGE, (MARSH OPPOSITE BLUFF POOL); **LINCOLN COUNTY:** 35835-B.K. LEACH WILDLIFE AREA (BKLWA), T50NR03E Surv 1693 NC; 36932-(BKLWA), T50NR03E Surv 1678 NE4; 36893-(SMALL HILLTOP POOL) IN CUIVRE RIVER STATE PARK T49NR01E Sec 18 NC; 35805-PRAIRIE SLOUGH WILDLIFE AREA, T51NR02E Surv 1676 SW4; **LIVINGSTON COUNTY:** 35893-SWAMP ALONG W SIDE OF U.S. Hwy 36, T57NR24W Sec 17 SE4SW4; **MERCER COUNTY:** 39997-CHLOE LOWRY MARSH, T65NR24W Sec 16 NW4; **NODAWAY COUNTY:** 32316-POOL N SIDE OF MO Hwy 46, T64NR35W Sec 15 SE4; **PEMISCOT COUNTY:** 34162-ROADSIDE POOL ALONG I-55, T18NR13E Sec 33 C; **PIKE COUNTY:** 36905-TED SHANKS WILDLIFE AREA (TSWA), T55NR02W Sec 27 NE4; 36912-(TSWA), T55NR02W Sec 22 C; 36916-DU PONT RESERVATION (DPR), T55NR02/03W Sec 07



Map 31:
Lymnaea (Stagnicola) elodes
Say

NW4NW4; 36918-(DPR), T55NR02/03W Sec 07 NW4NE4; 36925-(DPR), T55NR02/03W Sec 07 NW4SE4; **PUTMAN COUNTY:** 36881-REBEL COVE WILDLIFE AREA, T67NR16W Sec 33 NW4; **ST. CHARLES COUNTY:** 34167-MARAIS TEMPS CLAIR, T48NR05E Sec 24 NC.

Lymnaea (Stagnicola) elodes Say 1821
Common name: marsh pondsnail
Figure 56

Diagnostic characters:

Shell medium to large size (up to 32mm or more), elongate conic, fragile to rather solid. Shell surface usually with crowded growth striae (more distinct in whorls before body whorl); body whorl, in some, heavily malleated. Spire high, usually 2.5-3 times that of apertural length. Aperture half-moon shaped, columellar and parietal margins almost straight or strongly plaited.

Distribution in Missouri:

Found only in Upper and Lower Missouri divisions of the Prairie Region, and the Lowland Region (Map 31).

Records:

LINN COUNTY: 35899-ROADSIDE POOL @ U.S. Hwy 36, T57NR22W Sec 12 NW4; **MERCER COUNTY:** 39998-CHLOE LOWRY MARSH, T65NR24W Sec 16 NW4; **SALINE COUNTY:** 35904-VAN METER STATE PARK, T52NR22W Sec 25 NW; 38855 & 36857-VAN METER STATE PARK, T52NR22W Sec 25 WC; **SCOTT COUNTY:** 33810-POOL BETWEEN LEEVE & MISSISSIPPI RIVER, T29NR15E Sec 31 NE4.

GENUS *PSEUDOSUCCINEA* BAKER 1908

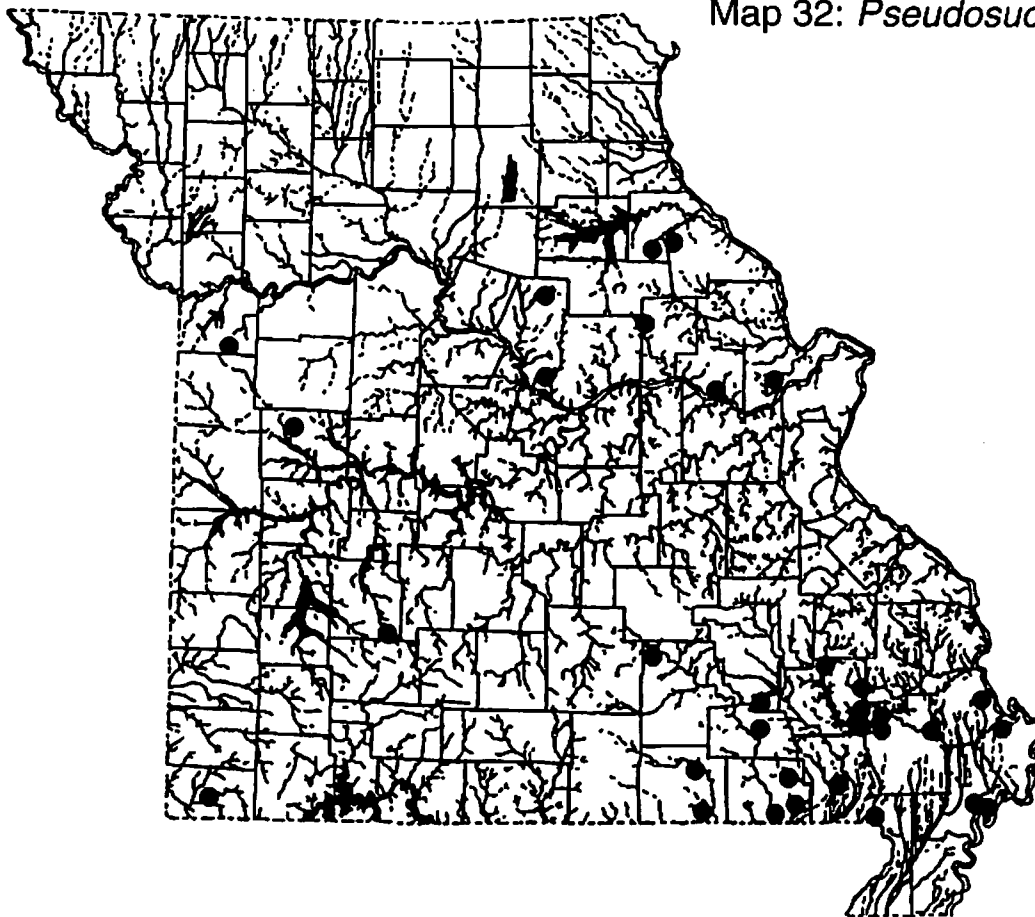
Genus characters:

Shell medium size, succiniform, thin and fragile; whorls with spiral striae. Spire generally short and somewhat dome-shaped; body whorl very large, expanded. Aperture large ovate (Fig. 57), outer margin simple, sharp and lacrimate at junction with body whorl (Fig. 58). Columellar margin gyrate, plait well marked.

Pseudosuccinea columella (Say 1817a)

Common name: mimic lymnaea
Figures 57-58

Map 32: *Pseudosuccinea columella*
(Say)



Diagnostic characters:

Shell medium to large sized (length 14.5mm with 4 1/8 whorls; up to 19mm in length), thin, fragile, transparent, surface shining covered with impressed spiral lines. Spire dome-shaped or elongated conic; body whorl extremely large; aperture ovate to round ovate; outer margin simple and columellar margin not reflected, columellar axis slightly twisted.

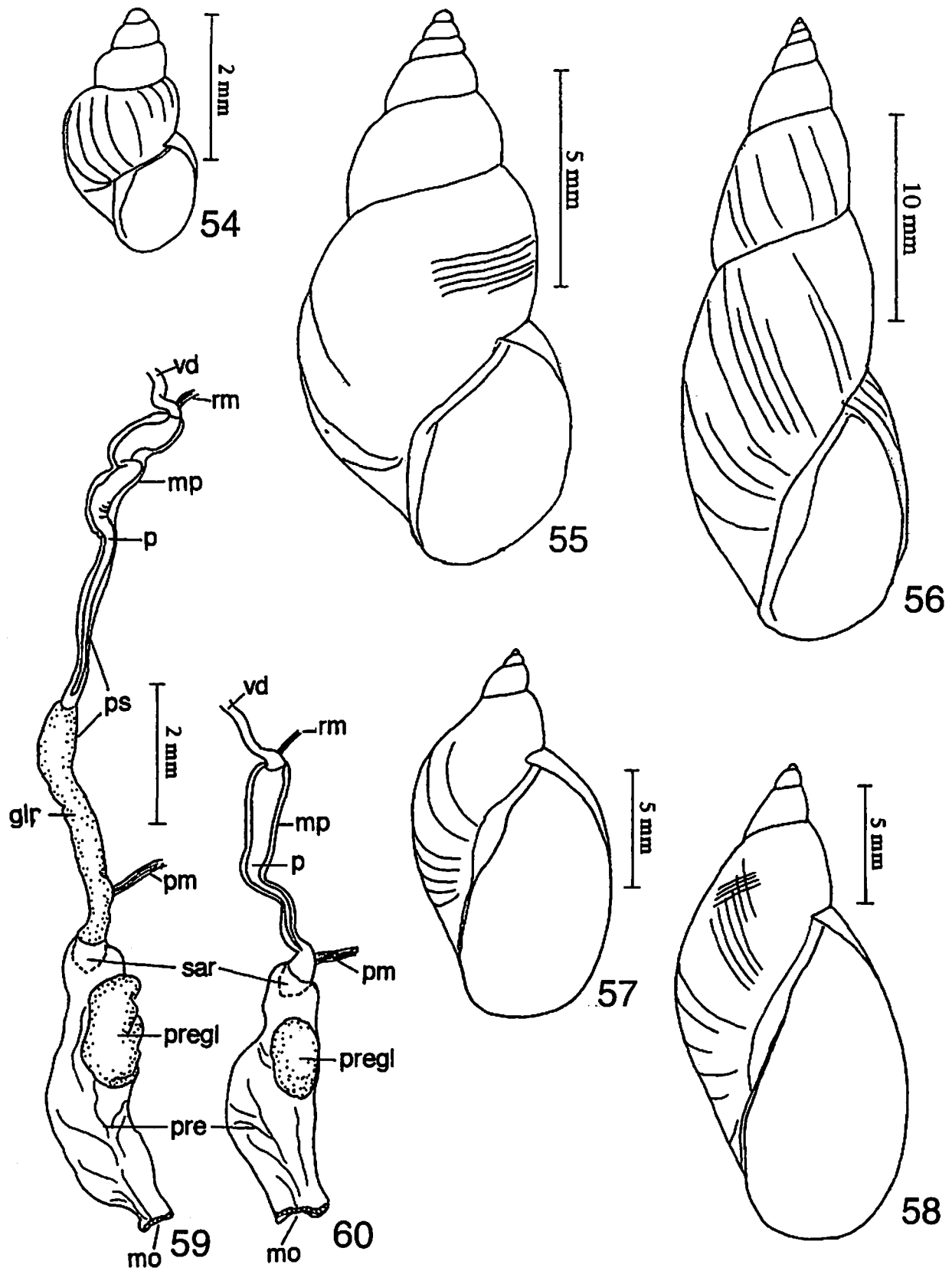
Distribution in Missouri:

Distributed in Lowland, Ozark (mainly Southeast Division), and Prairie (Mississippi and Lower Missouri Divisions) (Map 32).

Records:

BOONE COUNTY: 31792-GORDON'S FARM POND, T51NR12W Sec 28; 35810-BRUSHY CREEK, T46NR11W Sec 18 SE4NW4; **BUTLER COUNTY:** 33815-ROADSIDE POOL @ U.S. Hwy 60, T24/25NR07E Sec 05/32; **CARTER COUNTY:** 33800-MUTTON HOLLOW FEN, T27NR01E Sec 02; **DUNKLIN COUNTY:** 36993-ST. FRANCIS RIVER (OLD CHANNEL) T22NR08E Sec 29 NE4/32 SE4; **HENRY COUNTY:** 34269-SWAMP/LAKE @ MO Hwy 07, T42NR27W Sec 22 NC; **JACKSON COUNTY:** 37043-PLOVER

LAKE, T47NR31W Sec 15 NE4SW4; **McDONALD COUNTY:** 29336-LITTLE SUGAR CREEK, T22NR32W Sec 34; **MISSISSIPPI COUNTY:** 33821-UPPER BIG LAKE, T27NR16E Sec 30 SW4NW4; **MONTGOMERY COUNTY:** 36844-LAKE WHITESELL IN MARSHALL I. DIGGS WILDLIFE AREA, T50NR06W Sec 31 NW4NW4; **NEW MADRID COUNTY:** 36998-STUMP HOLE, T23NR15E Sec 35 NE4NE4; 37004-RANSBURGH HOLE, T23NR14E Sec 36 NE4NE4; **OREGON COUNTY:** 36136-FALLING SPRING CAVE, T25NR03W Sec 04; 37158-FREDERICK CREEK @ CO Hwy Y, T22NR03W Sec 12; **PIKE COUNTY:** 35826-CROOKED CREEK @ CO Hwy C, T54NR04W Sec 08 NW4NW4. **POLK COUNTY:** 34267-POMME DE TERRE RIVER, T32NR21W Sec 22 WC; **RALLS COUNTY:** 36508-SINKHOLE POND BESIDE CHURCH @ CO Hwys P & JJ, T54NR06W Sec 34 EC; **REYNOLDS COUNTY:** 32762-POOL NEAR CHURCH @ CO Hwy HH, T29NR01E Sec 34 SE4SE4; **RIPLEY COUNTY:** 36090-CURRENT RIVER, T22NR02E Sec 36 SE4NW4; 35957-LITTLE BLACK RIVER IN MUD PUPPY WILDLIFE AREA, T24NR03E Sec 23 C; 36098-TURKEYPEN HOLLOW CREEK, T22NR03E Sec 14 NW4NW4; **ST. CHARLES COUNTY:** 37189-LAKE 22 & 35830-LAKE 34, IN BUSCH WILDLIFE AREA; **SCOTT COUNTY:** 33812-POWERS ISLAND CHUTE, T28NR15E Sec 17 SW4; **SHANNON COUNTY:** 36108-



CURRENT RIVER, T31NR05W Sec 28 SE4SW4; STODDARD COUNTY: 34156-MINGO RIVER IN MINGO NATIONAL WILDLIFE REFUGE; 36990-WILLIAMS CREEK @ CO Hwy AB, T26NR11E Sec 11; WARREN COUNTY: 36492-HOWARD BEND FORK, T45NR02W Sec 09 NE4; WAYNE COUNTY: 32278-BEAR CREEK @ CO Hwy C, T29NR07E Sec 19; 34235-DRY CREEK @ MO Hwy 143, T29NR05E Surv 849; 32594-STANLEY CREEK, T27NR07E Sec 13 NE4NE4; 34223-LOST CREEK, T27NR07E Sec 05 NE4NE4; 34225-LOST CREEK, T27NR07W Sec 03 WC; 32275-LOST CREEK @ CO Hwy D, T28NR07E Sec 31; 35928-McGEE CREEK @ CO Hwys P & TT, T28NR08E Sec 20.

FAMILY PHYSIDAE FITZINGER 1833

Family characters:

Shell small to rather large, thin or slightly thickened, hyperstrophic (i.e., sinistral), conispiral and non-umbilicate. Aperture large, angled above and rounded below. Spire short to moderately produced. Surface smooth or with well marked microsculpture (Clarke, 1973).

GENUS *PHYSA* DRAPARNAUD 1801

Genus characters:

Shell small to medium sized, subovate, and with or without fine spiral sculpture (Clarke, 1973).

The subgeneric groupings and nomenclature of the American physids are still in chaos. It is generally agreed that there are three types of male genitalia: *Physa*, *Physella* (Fig. 59) (= *gyrina*-type of Clampitt, 1970) and *Physodon* (Fig. 60) (= *integra*-type of Clampitt, 1970). Liu (1993, 1994) found that the *gyrina* and *integra* types yielded distinct isozyme patterns. Only *Physella* and *Physodon* occur in Missouri.

SUBGENUS *PHYSELLA* (HALDEMAN 1842) BAKER 1926 emended

In general, shell surface with fine spiral striae and growth lines (Fig. 62); aperture with reddish or chestnut colored varicose thickening within; terminal male genitalia (Fig. 59): preputium with preputial gland and a sarcovelum within, penial sac subdivided into two portions (glandular and translucent, membranous sheath portions) (Wu & Beetle, 1996).

The male genitalia agrees with that of Baker's (1926) description. Baker followed Haldeman (1842) in selecting the type species *Physa globosa*, which is different from any other known American *Physa* (Clench, 1930) and has not yet been adequately investigated anatomically (Paraense, 1987).

Physa (Physella) elliptica Lea 1837

Common name: elliptic physa
Figures 61-62

Diagnostic characters:

Shell elliptical, medium sized, surface shiny and chestnut colored, with fine sculpture (Fig. 62). Spire rather short, bluntly conic; whorls slightly convex, suture impressed; body whorl large, shouldered at base. Aperture narrowly ovate, parietal wall and columella obliquely straight; parietal callus thin and wide; outer lip round, with a reddish varicose thickening within.

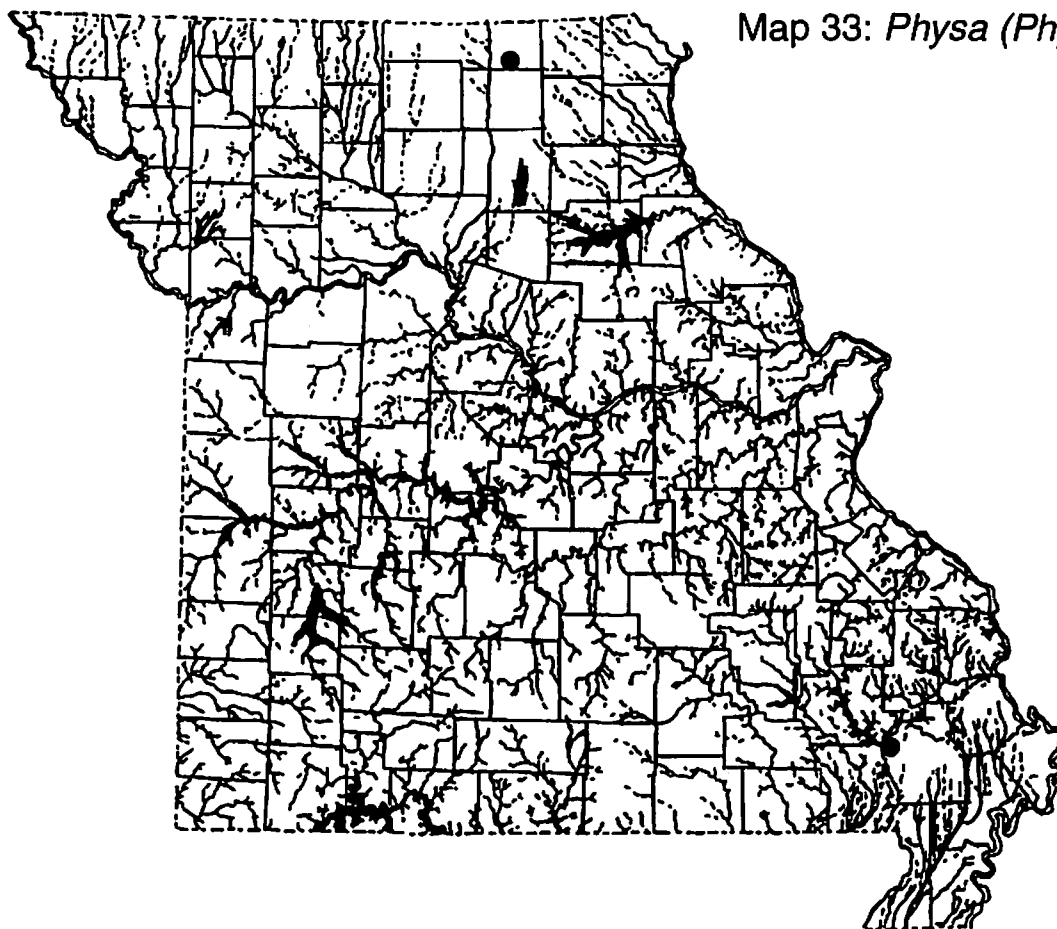
Distribution in Missouri:

Only one lot from Schuyler County and north of the Missouri River; one lot from Stoddard County in the southeastern Lowland Region (Map 33).

Records:

SCHUYLER COUNTY: 37174-BORROW PIT, T64NR15W Sec 03 SE4; STODDARD COUNTY: 34150-MINGO NATIONAL WILDLIFE REFUGE, POOL BY ROAD W OF ROCK HOUSE LAKE.

FIGS. 54-60. Shells of Family Lymnaeidae & the types of terminal male genitalia of the Physidae. FIG. 54. *Lymnaea (Fossaria) parva* Lea: Apertural view. UCM 38041. Shell length 3.5mm, 5 1/8 whorls. FIG. 55. *Lymnaea (Stagnicola) caperata* Say: Apertural view. UCM 32312. Shell length 12.6mm, 6 7/8 whorls. FIG. 56. *Lymnaea (Stagnicola) elodes* Say: Apertural view. UCM 36855. Shell length 30.5mm, 7 1/4 whorls. FIG. 57. *Pseudosuccinea columella* (Say): Apertural view. UCM 36492. Shell length 14.5mm, 4 1/8 whorls. FIG. 58. *Pseudosuccinea columella* (Say): Apertural view. UCM 36508. Shell length 19 + mm, (apical tip broken). FIG. 59. *Physella*-type: *Physa (Physella) goodrichi* Lea. UCM 37185. FIG. 60. *Physodon*-type: *Physa (Physodon) anatina* Lea. UCM 37196. (Abbreviations: glp, glandular portion of penial sac; mo, male opening; mp, membranous portion of penial sac; p, penis; pm, protractor muscles; pre, preputium; pregl, preputial gland; ps, penial sac; rm, retractor muscles; sar, sarcovelum; vd, vas deferens.)



Map 33: *Physa (Physella) elliptica*
Lea

***Physa (Physella) goodrichi* Clench 1926**

Common name: Goodrich's physa

Figures 59, 63-64

Diagnostic characters:

Shell globose, medium sized, surface glossy or rough, brownish straw color. Spire conic; whorls convex, suture slightly impressed, body whorl extremely large and globose, round, surface smooth or malleated. Aperture large, almost semicircular with reddish varicose thickening inside; parietal callus wide.

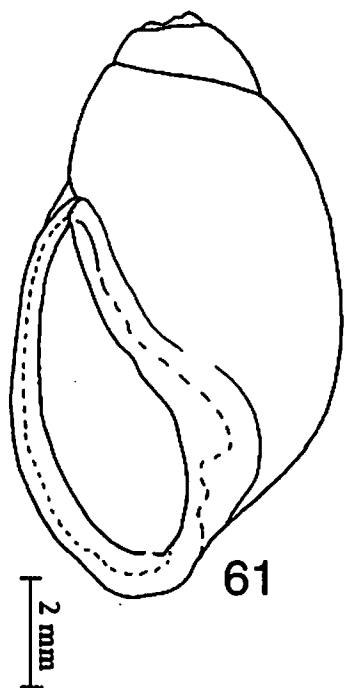
Distribution in Missouri:

Mainly in Ozark Region (Map 34).

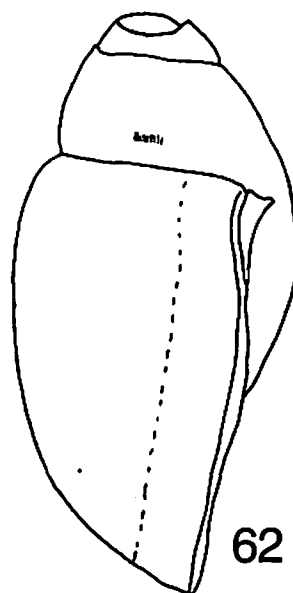
Records:

CAMDEN COUNTY: 33768-RAINWATER HOLLOW CREEK, T38NR18W Sec 04 EC; **CRAWFORD COUNTY:** 34144-HUZZAH CREEK, T38NR03W Sec 23; **DALLAS COUNTY:** 33716-BENNETT SPRING IN BENNETT SPRING STATE PARK; **DENT COUNTY:** 36143-MONTAUK SPRING IN MONTAUK SPRING STATE PARK, T32NR07W Sec 22 NE4NE4; **IRON COUNTY:** 34244-BIG RIVER, T35NR01E Sec 34 NE4; **JEFFERSON**

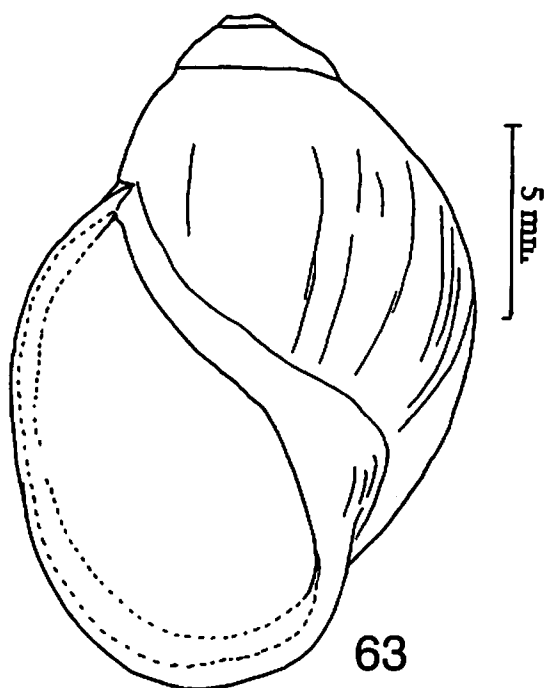
COUNTY: 36018-DRY CREEK, T40NR03E Sec 14 NW4; **LINCOLN COUNTY:** 32547-SUGAR CREEK, T49NR01E Sec 17 S2; **OREGON COUNTY:** 32134-ELEVEN POINT RIVER (EPR), T25NR03W Sec 31 NW4; 34257-(EPR), T23NR02W Sec 17 SE4; 35869-(EPR), T23NR02W Sec 17 SE4NC; 33763-SPRING RIVER, T22NR05W Sec 32 WC; 36036-WALTERS CAVE SPRING, T25NR03W Sec 22; **OZARK COUNTY:** 32124-SPRING CREEK AT ROCKBRIDGE, T24NR13W Sec 04; **PULASKI COUNTY:** 14250-BIG PINEY RIVER; **REYNOLDS COUNTY:** 40407-REEDS SPRING, T32NR01E Sec 28 SW4; **ST. CHARLES COUNTY:** 35829-LAKE 34 IN BUSCH WILDLIFE AREA, T46NR03E Sec 19; **SHANNON COUNTY:** 34136-ROUND SPRING BRANCH, T30NR04W Sec 20; 36103-CURRENT RIVER, T31NR06W Sec 24 NW4; 34126-JACKS FORK RIVER (JFR), T29NR04W Sec 27 NE4; 35864-(JFR), T28NR06W Sec 25 SE4; 35939-(JFR), T27NR06W Sec 06 NW4; 37185-ROUND SPRING BRANCH, T30NR04W Sec 20 NW4; 37111-ROUND SPRING BRANCH, T30NR04W Sec 20 NW4SE4; **STODDARD COUNTY:** 35798-ROADSIDE POOL ALONG MO Hwy 51, T27NR09E Sec 19 NW4; **WARREN COUNTY:** 36487-CHARETTE CREEK, T46NR02W Sec 23 NE4; **WAYNE COUNTY:** 32277-MINGO NATIONAL WILDLIFE REFUGE, @ FLATBANKS.



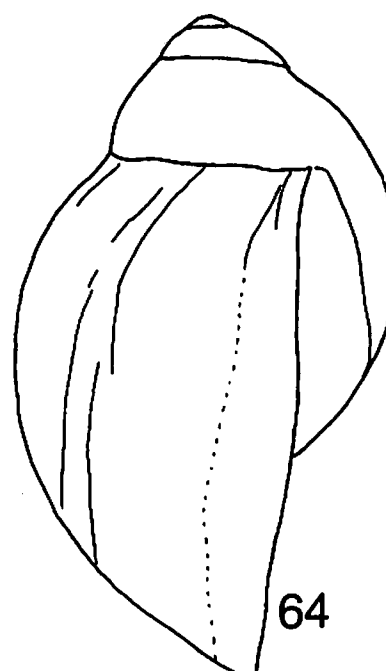
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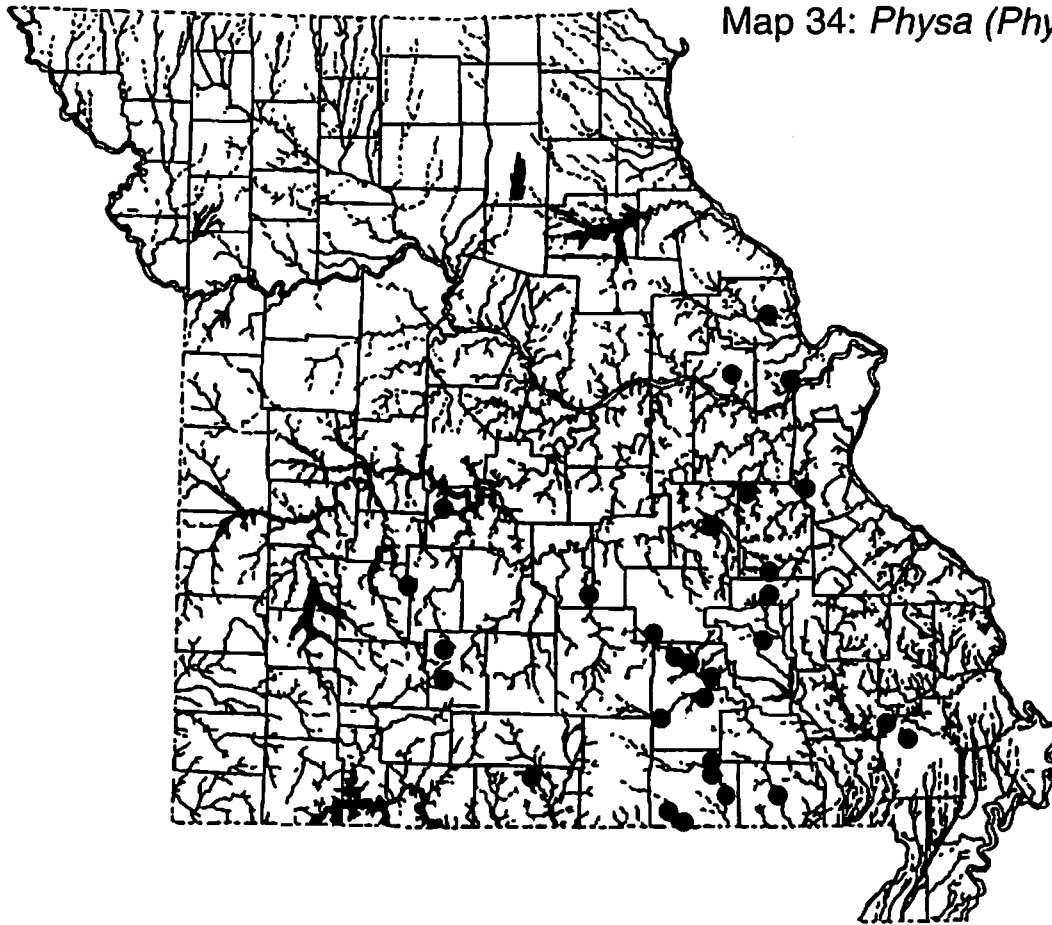


63



64

FIGS. 61-64. Shells of Family Physidae FIGS. 61-62. *Physa (Physella) elliptica* Say: Apertural and left-side views. UCM 34150 (apical tip broken). FIGS. 63-64. *Physa (Physella) goodrichi* Clench: Apertural and left-side views. UCM 12425 (apical tip slightly broken).



Map 34: *Physa (Physella) goodrichi*
Clench

Remarks:

Physa plena Clench 1930 was collected by P.R. Remington from Reed Spring, near Centerville, in Reynolds County in Missouri; this might be the same species.

***Physa (Physella) gyrina* Say 1821**

Common name: tadpole physa

Figures 65-70

Diagnostic characters:

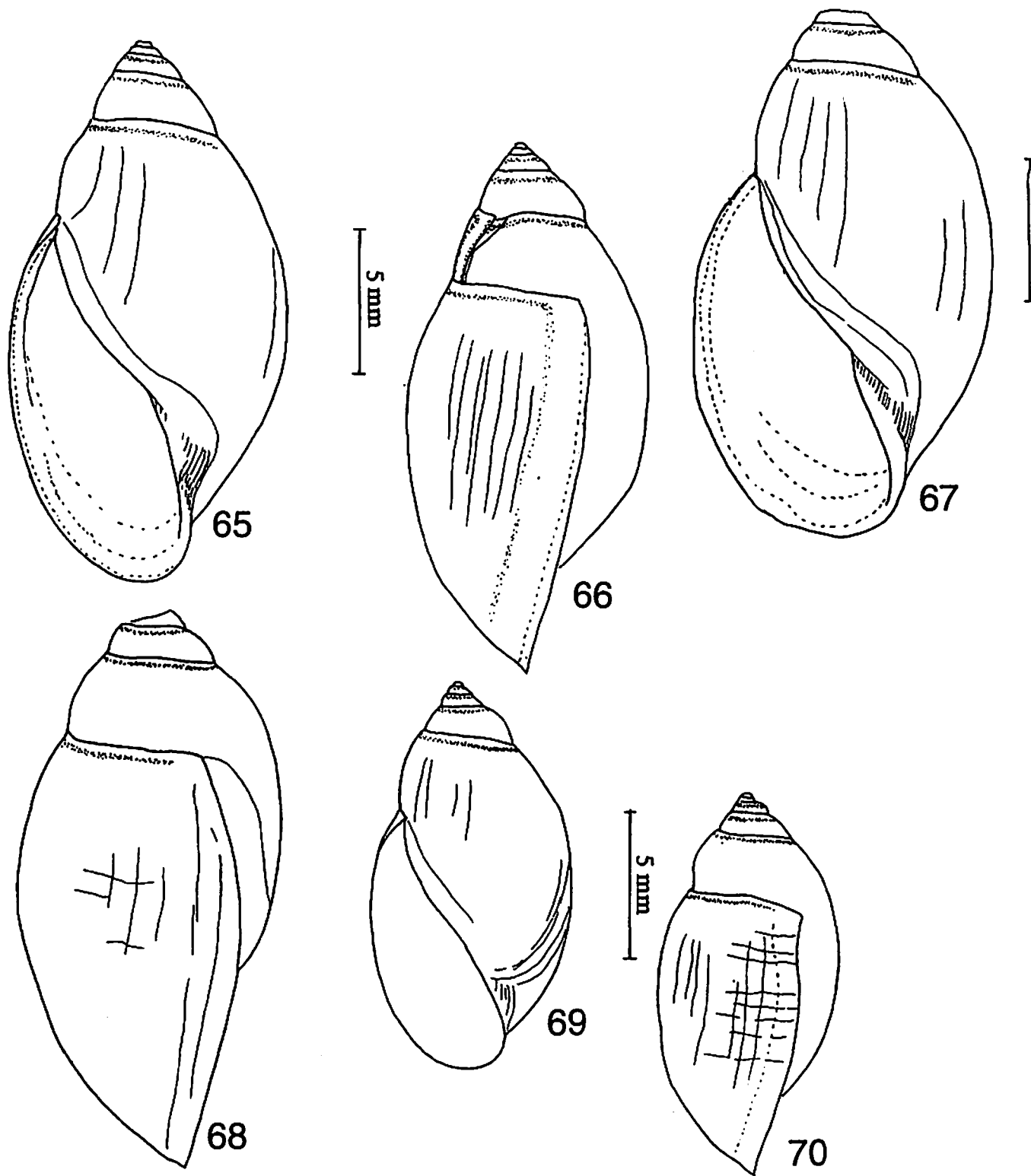
Shell elongately ovate, medium sized, surface evenly spaced with raised lines, smooth to rough and malleated. Spire pronounced, conic, bluntly acute; whorls convex; suture moderately impressed. Aperture narrowly ovate; angle of outer lip and parietal wall very acute; outer lip round with reddish varicose thickening within; parietal callus wide, straight (Fig. 69) or weakly (Figs. 65, 67) twisted over columella.

Distribution in Missouri:

Widely distributed in Missouri (Map 35).

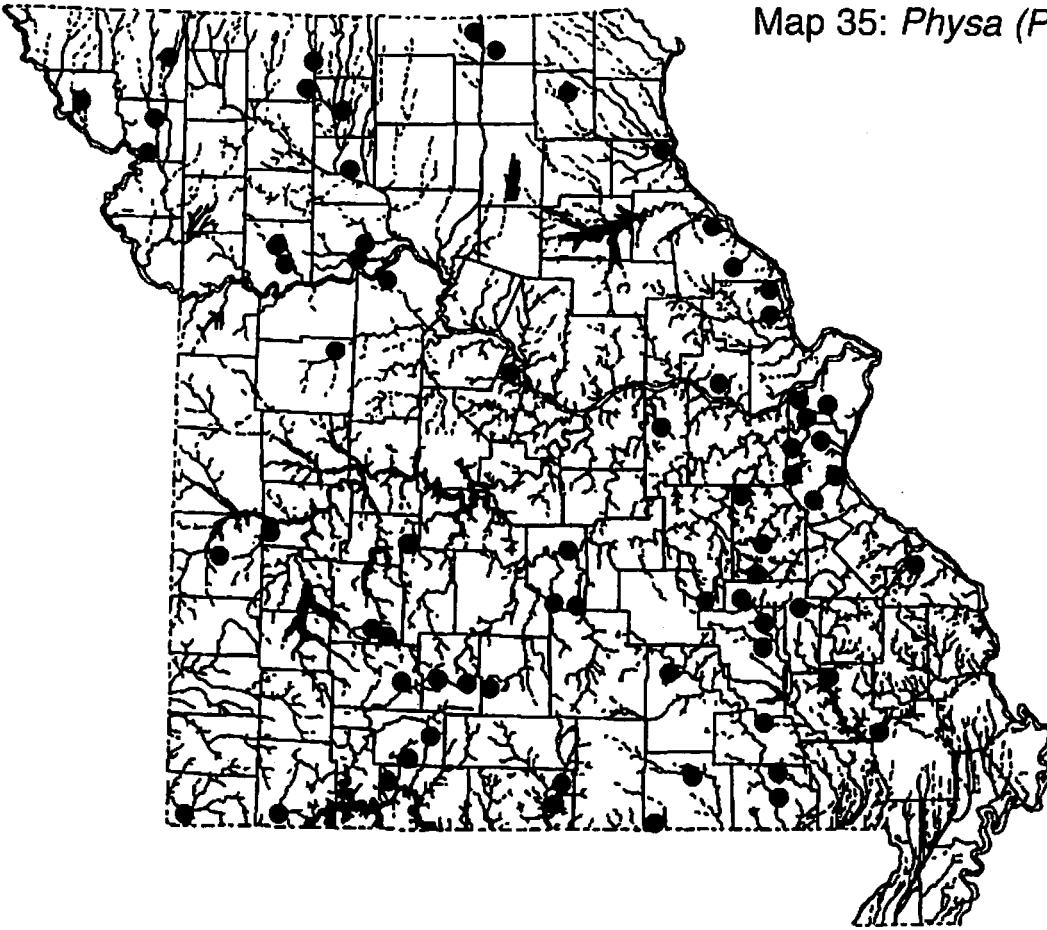
Records:

ANDREW COUNTY: 37191-HADORN BRIDGE ACCESS, T60NR35W Sec 14; 37162-NODAWAY ISLAND ACCESS, T58NR36W Sec 26 N2; 32313-ROADSIDE DITCH, @ NODAWAY ISLAND ACCESS, T58NR36W Sec 26 N2; 32555-ROADSIDE POOL @ CO Hwy C, T60NR35W Sec 35/10; **BARRY COUNTY:** 33718-DRY HOLLOW CREEK IN ROARING RIVER STATE PARK, T22NR27W Sec 29 SE4; **BATES COUNTY:** 32552-UNNAMED CREEK, T40NR31W Sec 03 SW4; **CARROLL COUNTY:** 36474-ROADSIDE DITCH ALONG U.S. Hwy 65, T52NR23W Sec 17 NE4; **CARTER COUNTY:** 38601-MUTTON HOLLOW FEN, T27NR01E Sec 02; 36479-CATTAIL BORROW PIT, T53NR23W Sec 34 SW4NE4; **CHARITON COUNTY:** 37226-ROADSIDE POOL N OF MO Hwy 5, T54/55NR18W Sec 33; **CHRISTIAN COUNTY:** 35820 & 35822-TRIBUTARY OF WOODS FORK, T26NR21W Sec 26 NE4; **CLAY COUNTY:** 35857-POOLS B & D IN COOLEY LAKE WILDLIFE AREA, T51NR30W Sec 02 SE4; **DENT COUNTY:** 32157-EAST FORK OF HUIZZAH CREEK, T34NR02W Sec 18; **GASCONADE COUNTY:** 32963-PUNCHEON CREEK, T44NR06W Sec 36 NE4; **GRUNDY COUNTY:** 32334-ROADSIDE POOL ALONG MO Hwy 6, T61NR24W Sec 13 SC; **HARRISON COUNTY:** 32326 & 37166-POOL N OF U.S. Hwy 136, T64NR26W Sec 23 NE4; **HICKORY COUNTY:** 37070-LITTLE



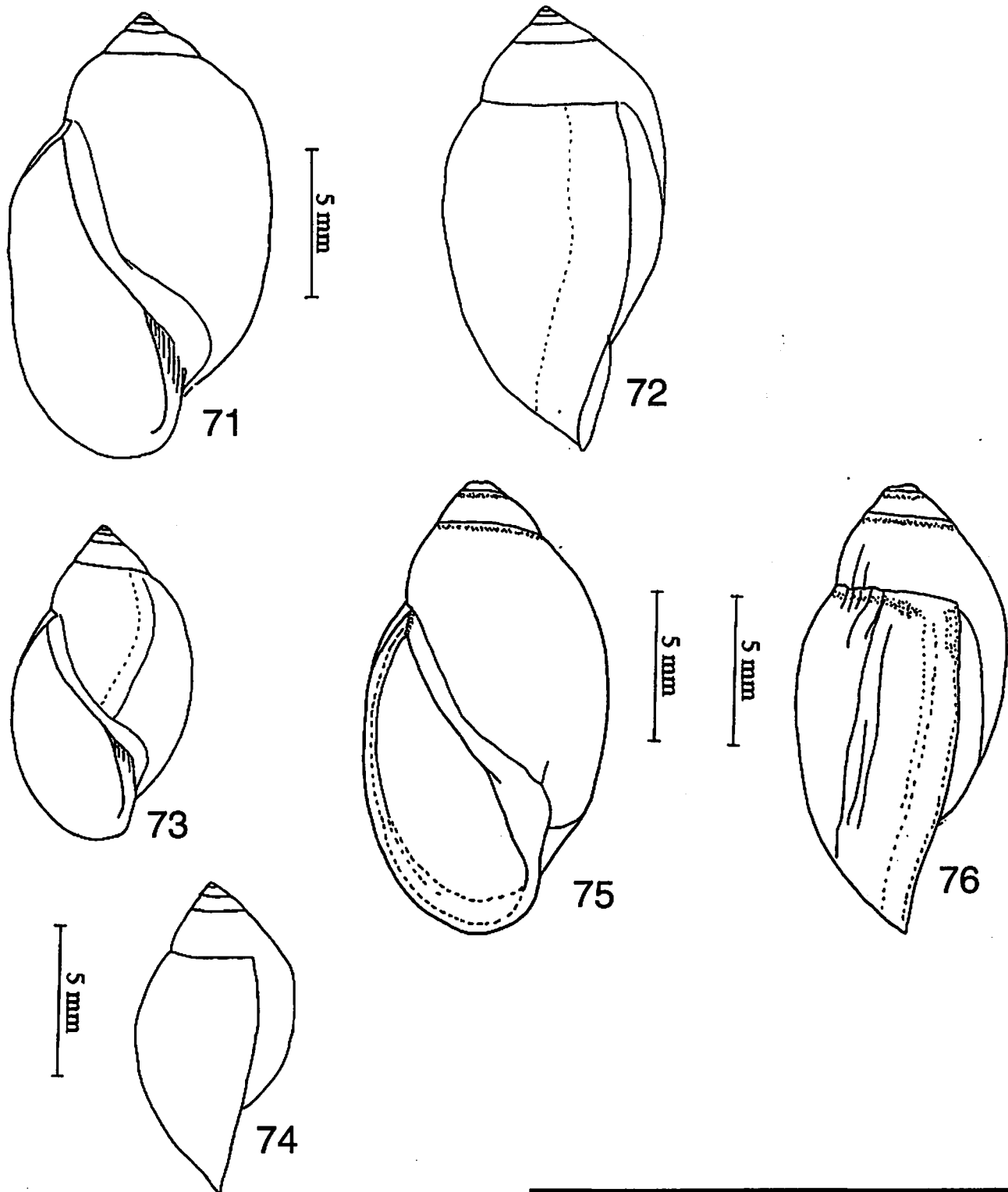
FIGS. 65-70. Shells of Family Physidae FIGS. 65-66. *Physa (Physella) gyrina* Say: Apertural and left-side views. UCM 36927 (apical tip broken). Shell length 18.5 + mm. FIGS. 67-68. *Physa (Physella) gyrina* Say: Apertural and left-side views. UCM 35857 (apical tip slightly broken). FIGS. 69-70. Young *Physa (Physella) gyrina* Say: Apertural and left-side views. From same as Figs. 67-68. Shell length 13.5mm, 5 1/4 whorls.

Map 35: *Physa (Physella) gyrina*
Say



NIANGUA RIVER @ CO Hwy BB, T37NR20W Sec 26; **HOLT COUNTY:** 36693-PELICAN POOL IN SQUAW CREEK NATIONAL WILDLIFE REFUGE (SCNWR), T61NR38W Sec 30 NW4; 36699-(SCNWR) OPPOSITE BLUFF POOL; 37221 & 37226-(SCNWR) OPPOSITE BLUFF POOL; 37016, 37235-(SCNWR), T61NR38W Sec 30; **IRON COUNTY:** 34242-STOUTS CREEK, T33NR04E Sec 05 WC; 34197-BARTON FEN, T34NR01W Sec 17 C; 33795-FEN ALONG GRAVEL ROAD, T34NR01W Sec 07; **JEFFERSON COUNTY:** 36934 & 37206-DUTCH CREEK @ CO Hwy NN, T42NR03E Sec 22/27; 36021-JOACHIM CREEK, T40NR04E Sec 35 SW4; 37207-JONES CREEK, T41NR03E Sec 15 NW4SE4; 36008-UNNAMED CREEK, T43NR04E Surv 3059 SE4; 36022-UNNAMED CREEK, T41NR06E Sec 05 SW4SW4; **JOHNSON COUNTY:** 37237-POND @ R & M PERRY MEMORIAL WILDLIFE AREA, T48NR24W Sec 33 NW4; **LINCOLN COUNTY:** 35833-B.K. LEACH WILDLIFE AREA, T50NR03E Surv 1693 NC; 35804-PRAIRIE SLOUGH WILDLIFE AREA (PSWA), T51NR02E Surv 1676; 36929-(PSWA), T51NR02E Sec 12 SW4; 36931-(PSWA), T50NR02E Surv 1678 NE4; **LIVINGSTON COUNTY:** 35895-BORROW PITS, T57NR24W Sec 11 NW4; 35892-SWAMP ALONG WEST SIDE OF U.S. Hwy 36, T57NR24W Sec 17 SE4SW4; **McDONALD COUNTY:** 35982-ELK RIVER, T21NR33W Sec 1/2; **MARION COUNTY:** 32428-ROADSIDE DITCH ALONG

U.S. Hwy 24, T57NR04W; 37169-ROADSIDE DITCH @ U.S. Hwy 24 JUST W OF MISSISSIPPI RIVER BRIDGE; **MONITEAU COUNTY:** 36000-MONITEAU CREEK, T47NR15W Sec35 SW4; **NODAWAY COUNTY:** 37163-ROADSIDE POOL @ U.S. Hwy 136, T64NR34W Sec 17 SE4; **OREGON COUNTY:** 32154-ELEVEN POINT RIVER, T25NR03W Sec 31 C; 33738-TWO MILE CREEK (TMC) @ MO Hwy 19, T22NR05W Sec 30; 38599-(TMC), T22NR05W Sec 19 NW4; 37176-(TMC) @ MO Hwy 19, T22NR05W Sec 30; 33741, 37175-WARM FORK OF SPRING RIVER, T22NR05W Sec 32; **OZARK COUNTY:** 33719-ALTHEA SPRING, T23NR12W Sec 25 NE4; 32130-NORTH FORK OF WHITE RIVER, T24NR11W Sec 33; **PERRY COUNTY:** 36461-RITTER CAVE, T36NR10E Surv 86; **PIKE COUNTY:** 36899-POOL IN TED SHANKS WILDLIFE AREA (TSWA), T55NR02W Sec 16/17; 36927-POOL IN (TSWA), T55NR02W Sec 18 EC; 36518-RAMSEY CREEK @ CO Hwys D & WW, T52NR01W Surv 1762; **POLK COUNTY:** 36132-TRIBUTARY OF LITTLE SAC RIVER @ MO Hwy 215, T32NR23W Sec 19/30; 37216-LITTLE SAC RIVER @ MO Hwy 13, T31NR22W Sec 09; **PULSAKI COUNTY:** 36467-GASCONADE RIVER, T37NR11W Sec 34 C; 38600-McCANN CREEK, IN FORT LEONARD WOOD, T34NR11W Sec 29 NW4; **PUTNAM COUNTY:** 36875 & 36880-REBEL COVE WILDLIFE AREA, T67NR16W Sec 33 NW4; **RAY COUNTY:** 35859-BOR-



FIGS. 71-76. Shells of the Family Physidae
 FIGS. 71-72. *Physa (Physella) heterostropha* Say: Apertural and left-side views. UCM 32270. Shell length 14.5mm, about 6 whorls. FIGS. 73-74. Young *Physa (Physella) heterostropha* Say: Apertural and left-side views. From same as UCM 32270. Shell length 10.5mm, 5 whorls. Figs. 75-76 *Physa (Physella) saffordi* Lea: Apertural and left-side views. UCM 39996 (Apical tip broken). Shell length 15 + mm; whorls 5.

ROW PIT @ MO Hwy 13 & CO Hwy B, T52NR27W Sec 06; 35882-PONDS IN CROOKED CREEK WILDLIFE AREA, T53NR28W Sec 16 E2; **REYNOLDS COUNTY:** 34247-BLACK RIVER @ MO Hwys 49/72, T32NR02E Sec 08; 33010-JOHNSON SHUT-INS STATE PARK T33NR02E Sec 17 NE4; **RIPLEY COUNTY:** 35962-BARTON BRANCH, T24NR02E Sec 12; 37173-TRIBUTARY OF CURRENT RIVER @ CO Hwy Y, T23NR02E Sec 15; 32583-SIMPSON CREEK @ CO Hwy Y, T23NR02E Sec 10; **ST. CLAIR COUNTY:** 32148-C POOL IN SCHELL-OSAGE WILDLIFE AREA, T38NR28W Sec 31; **ST. LOUIS COUNTY:** 31832-CARR CREEK, T44NR03E Sec 19/24; 32787-CRYSTAL SPRING IN BABLER STATE PARK, T45NR03E Sec 29; 34220 & 35912-DAVIDS SPRING, T44NR05E Sec 09 NE4; 32774-ROCKWOOD RESERVATION SPRING, T44NR03E Sec 10 SE4; 32786-ROCKWOOD RESERVATION SPRING # 2, T44NR03E Sec 10; **SALINE COUNTY:** 35902 & 36856-VAN METER STATE PARK, T52NR22W Sec 25 WC; **SCHUYLER COUNTY:** 33000-BORROW PIT ALONG CO Hwy T, T65NR16W Sec 23; SHANNON COUNTY: 36077-PULLITE SPRING, T30NR05W Sec 04; **STODDARD COUNTY:** 33004-BLUFF POOL BETWEEN FLATBANKS & MUSEUM IN MINGO NATIONAL WILDLIFE REFUGE, **TANEY COUNTY:** 35812-EMORY CREEK, T23NR21W Sec 05 NE4; **WARREN COUNTY:** 39496-CHARETTE CREEK, T46NR02W Sec 23 NE4; **WASHINGTON COUNTY:** 32982-PRATT SPRING, T40NR01W Sec 30; 37184-CUB CREEK, T35NR01W Sec 12 C; 32284-FOURCHE RENAULT CREEK, T37NR01E Sec 36 S2; 34186-JAMES CREEK, T35NR02E Surv 2320 NE4; **WAYNE COUNTY:** 35937-CEDAR WILMORE CREEK @ U.S. Hwy 67, T30NR06E Sec 07; **WEBSTER COUNTY:** 35985-JAMES RIVER, T29NR18W Sec 04NW4; 35989-TRIBUTARY OF JAMES RIVER, T29NR17W Sec 24 SW4; **WRIGHT COUNTY:** 38604-TRIBUTARY OF BAKER CREEK, T29NR16W Sec 36 N2

Physa (Physella) heterostrophia (Say 1817b)

Common name: pewter physa

Figures 71-74

Diagnostic characters:

Shell medium size, solid or fragile, ovate, surface straw-brown color. Spire conic (Fig. 73) or raised conic (Fig. 71), about 1/4 of shell length; penultimate whorls straight, suture not distinct; body whorl large, round in younger specimens (Fig. 73), but shouldered above and below in adults (Fig. 75). Aperture elongate-ovate; outer lip simple and shouldered above; parietal callus wide and strongly twisted over columella (Fig. 71, 73).

Distribution in Missouri:

Mainly from the Ozark Region and a few counties

in the Prairie Region near the Mississippi River (Map 36).

Records:

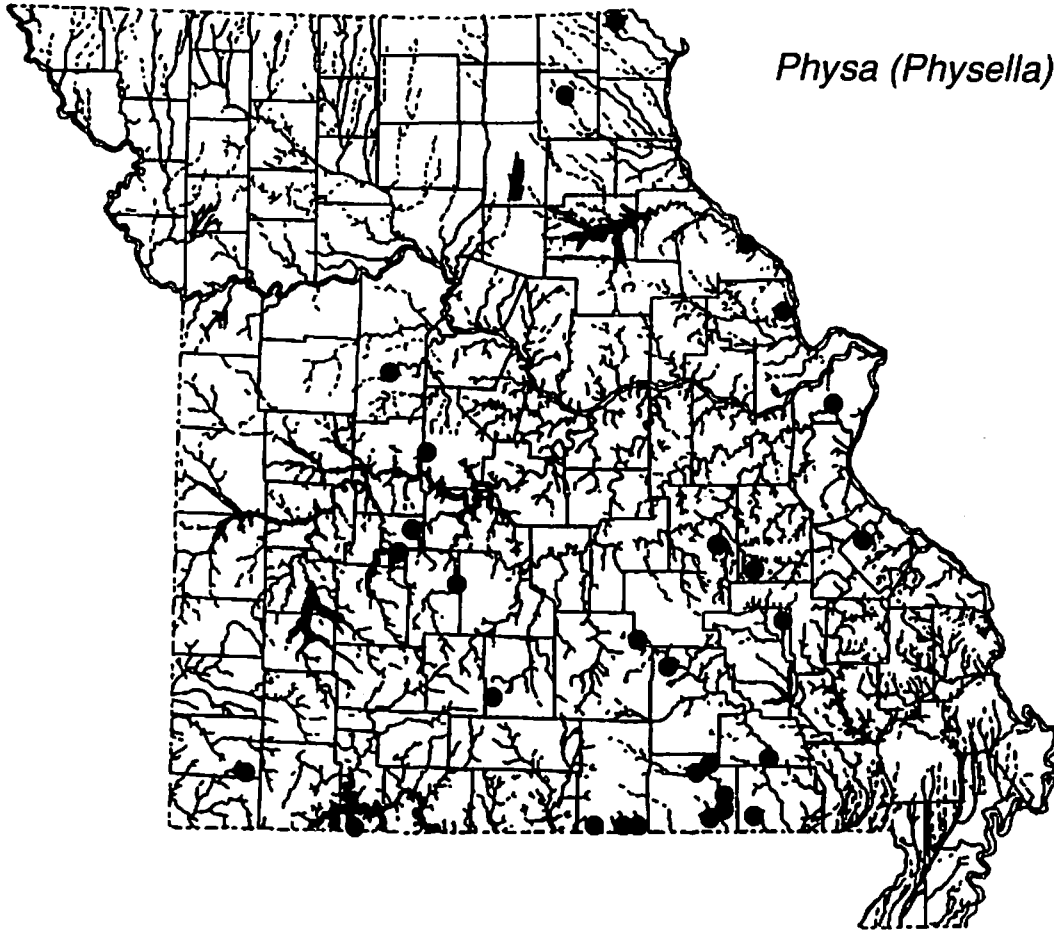
CARTER COUNTY: 34212-CURRENT RIVER, T26NR01E Sec 26 EC; **CLARK COUNTY:** 37229-LAKE IN FOX VALLEY STATE FOREST, T66NR08W Sec 21; **CRAWFORD COUNTY:** 34140-HUZZAH CREEK, T37NR02W Sec 06 NE4; **DENT COUNTY:** 36145-PIGEON CREEK, T32NR07W Sec 22 NW4; **HICKORY COUNTY:** 37072-STARKES CREEK, T36NR20W Sec 20 SE4; 37238-MILL CREEK, T37NR21W Sec 31 NE4; **HOWELL COUNTY:** 35977-BENNETT RIVER, T21NR10W Sec 02 NE4; 35973-SPRING RIVER, T21NR08W Sec 05 EC; 32270-UN-NAMED SPRING BRANCH, T21NR07W Sec 01 SW4; **KNOX COUNTY:** 31787-BORROW PIT EAST SIDE OF Hwy .15, T62NR11W Sec 19 SW4; **LACLEDE COUNTY:** 36065 & 36089-BENNETT SPRING BRANCH IN BENNETT SPRING STATE PARK, T35NR17W Sec 31 SW4; **LINCOLN COUNTY:** 37187-B.K. LEACH WILDLIFE AREA, T50NR03E Surv 1693 EC; **MORGAN COUNTY:** 37074-BIG BUFFALO CREEK, T41NR19W Sec 07 NW4; **NEWTON COUNTY:** 40103-INDIAN CREEK @ BOULDER CITY; **OREGON COUNTY:** 36023-BARRETT SPRING, T25NR03W Sec 03 SW4; 32154-ELEVEN POINT RIVER (EPR), T25NR03W Sec 31 C; 35879-(EPR), T23NR02W Sec 21 SE4; 35942-(EPR), T23NR02W Sec 17 SE4; 36050-(EPR), T24NR02W Sec 32 SE4; 36149-(EPR), T25NR03W Sec 31 NW4; 36951-(EPR), T24NR02W Sec 18 C; 36964-(EPR), T24NR02W Sec 18 C; 36969-(EPR), T24NR02W Sec 20 SW4; 37157-FREDERICK CREEK, T22NR03W Sec 12; **PETTIS COUNTY:** 37027-CEDAR CREEK, T46NR21W Sec 16 E2; **PIKE COUNTY:** 37241-MISSISSIPPI RIVER, T54NR01W Sec 36 NE4; **REYNOLDS COUNTY:** 37186-EAST FORK OF BLACK RIVER, T33NR02E Sec 16 NW4; **RIPLEY COUNTY:** 37212-CURRENT RIVER, T22NR02E Sec 04 SE4; 35964-FOURCHE CREEK, T22NR01W Sec 08 NE4. **ST. LOUIS COUNTY:** 34218-DAVID'S SPRING, T44NR05E Sec 09 NE4; **STE. GENEVIEVE COUNTY:** 36044-FOURCHE A DU CREEK, T37NR06E Sec 02 NE4NE4; **SHANNON COUNTY:** 37220-CURRENT RIVER, T31NR05W Sec 21/28; **STONE COUNTY:** 33761-INDIAN CREEK, T21NR23W Sec 07 NE4SE4; **WASHINGTON COUNTY:** 34188-COURTOIS CREEK, T36NR01W Sec 32 C; 34191-COURTOIS CREEK, T35NR01W Sec 08 NW4NW4; **WRIGHT COUNTY:** 35991-BAKER CREEK, T29NR16W Sec 36 N2.

Physa (Physella) saffordii Lea 1864

Common name: Safford physa

Figures 75-76

Map 36:
Physa (Physella) heterostrophia
(Say)



Diagnostic characters:

Shell elliptical, medium size, surface light chestnut color, shining. Spire conic, 1/3 of shell length, suture not impressed. Aperture narrowly elongated; inside of outer lip with a low varicose thickening; parietal lip and columella nearly straight and with a moderately wide callus.

Distribution in Missouri:

Found only in the Prairie Regions north of the Missouri River (Map 37).

Records:

AUDRAIN COUNTY: 36500-ROADSIDE POOL ALONG MO Hwy 54, T50NR09W Sec 14 SW4SW4; **GRUNDY COUNTY:** 37167-ROADSIDE POOL ALONG MO Hwy 6, T61NR24W Sec 13 SC; **LINN COUNTY:** 32442-LOCUST CREEK @ U.S. Hwy 36, T57NR21W Sec 02 SW4/11 NW4; **MACON COUNTY:** 32989-BORROW PIT BETWEEN RR AND CO Hwy D, T60NR14W Sec 5 NW4NW4. **MERCER COUNTY:** 39996-CHLOE LOWRY MARSH, T65NR24W Sec 16 NW4.

***Physa (Physella) salina* Clench 1930**

Common name: saline physa

Figures 77-78

Diagnostic characters:

Shell elongated cylindrical, medium sized (23mm in length), light yellowish color, surface rough and malleated. Spire produced, about 1/3 of shell length; whorls convex, suture distinct, body whorl large with evenly spaced axial lines. Aperture elongate ovate, outer lip shouldered above, basal lip round; parietal callus wide, strongly twisted over columella.

Distribution in Missouri:

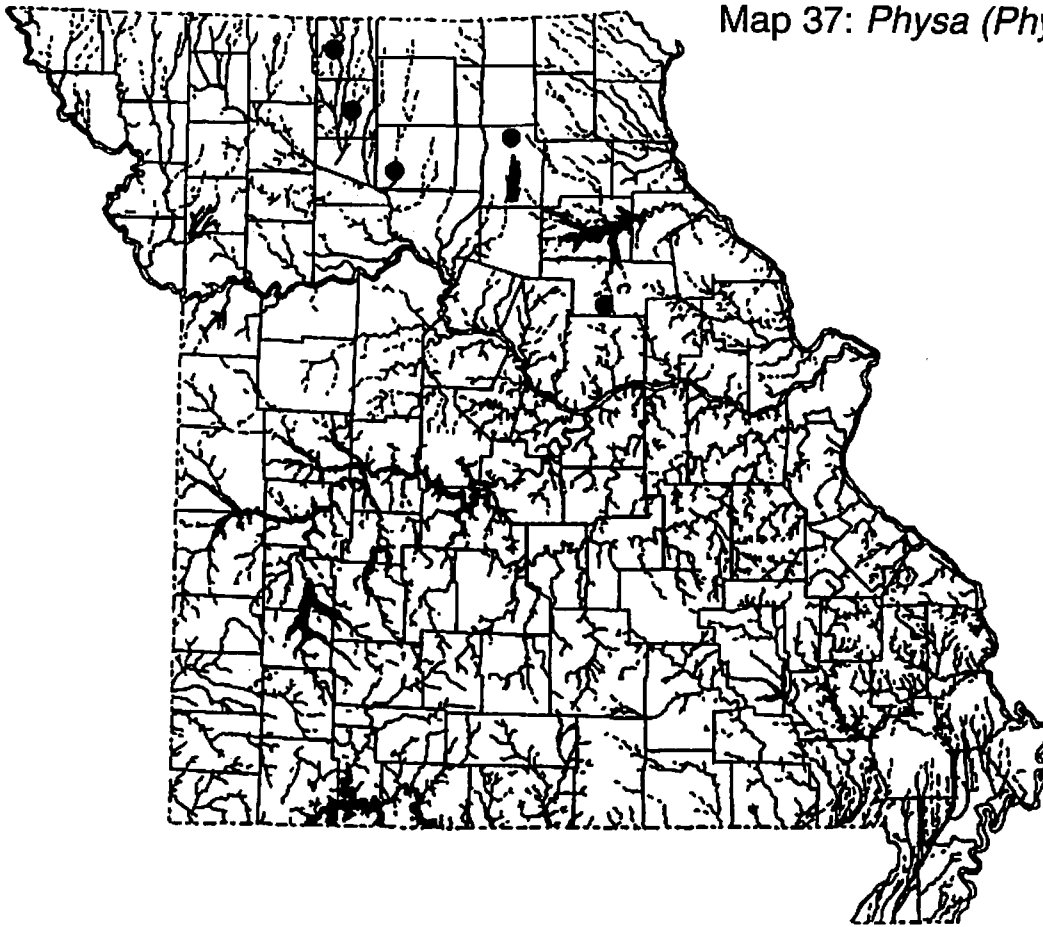
Found only in the Missouri Prairie Region (Map 38).

Records:

CLAY COUNTY: 38602-POOLS B & D IN COOLEY LAKE WILDLIFE AREA, T51NR30W Sec 02 SE4.

Remarks:

A single specimen was found in a collection of



Map 37: *Physa (Physella) saffordii*
Lea

Physa gyrina (UCM 35857) from Clay County. Its shell characters are quite different from *P. gyrina* but match those of the holotype of *P. salina*, fairly well. Since *P. salina* was originally described from Utah, this shell is provisionally placed under this species.

**SUBGENUS *PHYSODON* (HALDEMAN 1842)
BAKER 1926 emended**

In general, shell surface smooth and shiny; aperture with either white or red varicose thickening within, terminal male genitalia (Fig. 60): preputium with preputial gland and a sarcovelum within, penial sac with only translucent membranous sheath which houses the penis (Baker, 1926; Clampitt, 1970; Wu & Beetle, 1996).

The anatomy of the male genitalia agrees with that of Baker's (1926) definition. Baker followed Haldeman (1842) in selecting *Physa microstoma* as the type species and commented that approximation must necessarily be tentative until the anatomy of *P. microstoma* is known.

***Physa (Physodon) acuta* Draparnaud 1805**
Common name: lateritic physa
Figures 79-80

Diagnostic characters:

Shell small, elongately-ovate, solid, surface always encrusted with a black coating. Spire (Fig. 79) acutely conic, 1/3 of shell length, whorls shouldered (Figs. 79-80) and sutures well impressed. Aperture ovate, outer lip simple, with white varicose thickening within; parietal callus narrow and thick, reflected over columella.

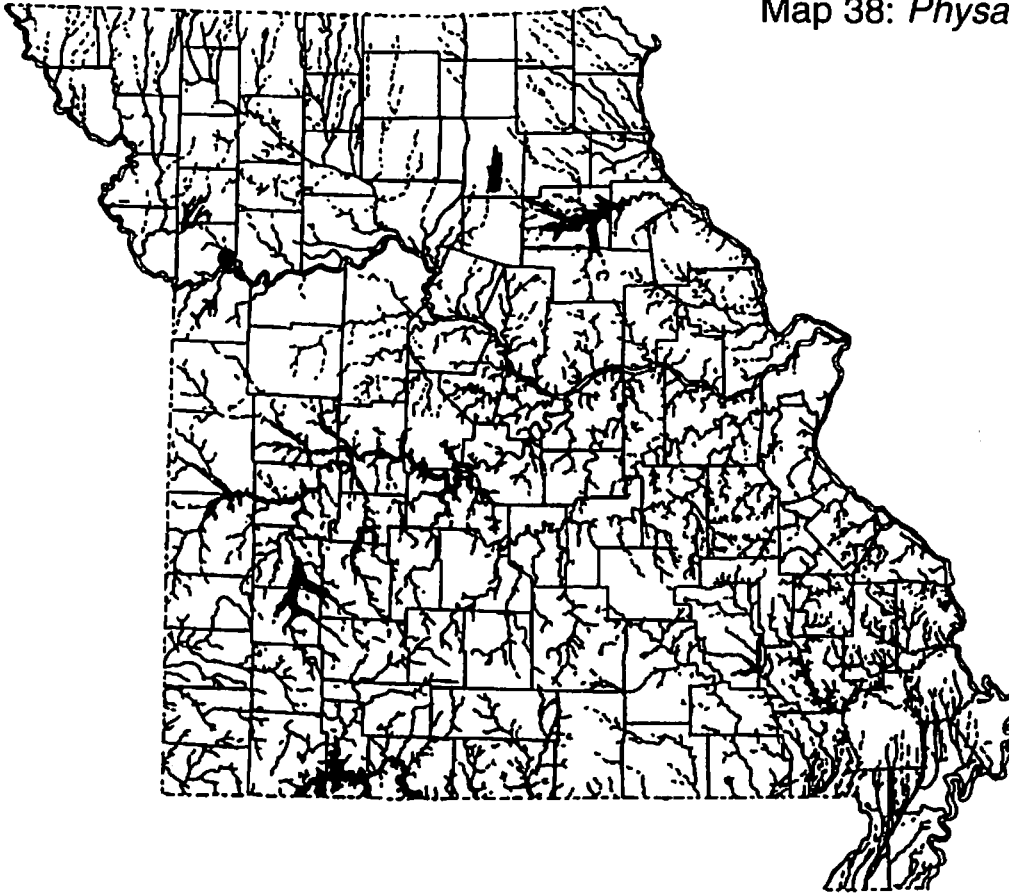
Distribution in Missouri:

Scattered distribution in the northwestern and southeastern portions of Missouri (Map 39).

Records:

BUTLER COUNTY: 35953-SLOUGH ALONG U.S. Hwy 160, T24NR05E Sec 36 NW4NW4; **CARTER COUNTY:** 33754-STREAM OUTSIDE MIDCO CAVE, T27NR02W Sec 27; **GRUNDY COUNTY:** 37168-ROADSIDE POOL ALONG MO. Hwy 6, T61NR24W Sec 13 SC; **HICKORY COUNTY:** 37065-LITTLE

Map 38: *Physa (Physella) salina*
Clench



WEAUBLEAU CREEK, T37NR23W Sec 32 SW4S2; HOLT COUNTY: 35841-BIG LAKE IN BIG LAKE STATE PARK, T61NR40W Sec 19 C; 36687-BETWEEN EAGLE & PELICAN POOLS IN SQUAW CREEK NATIONAL WILDLIFE REFUGE; HOWELL COUNTY: 37202-BENNETT RIVER @ MO. Hwy 142, T21NR10W Sec 02; JACKSON COUNTY: 37036-BIG CREEK, T47NR31W Sec 23 SE4SE4; 37037-JAMES REED MEMORIAL WILDLIFE AREA, T47NR31W Sec 23 NE4NE4; 37048-LONE JACK LAKE, T47NR30W Sec 11 SE4SW4; LINN COUNTY: 37171-LOCUST CREEK, T57NR21W Sec 02 SW4/11 NW4; OREGON COUNTY: 35945-ELEVEN POINT RIVER, T23NR02W Sec 34 SW4SE4; ST. FRANCOIS COUNTY: 34179-TERRE BLEUE CREEK, T37NR05E Surv 2107 NE4.

Remarks:

This is a European species introduced into portions of the continental United States (Burch, 1989). Its shell is always encrusted with a black coat. Paraense (1987) mentioned that this results from adsorption by the shell surface of ferric oxide present in lateritic soils.

***Physa (Physodon) anatina* Lea 1864**

Common name: duck physa

Figures 60 & 81-84

Diagnostic characters:

Shell medium size, fusiform (Fig. 81), to elongate fusiform (Fig. 83), translucent and thin in juveniles, dull and thick in adult specimens. Spire conical (Fig. 81), to elongate conical (Fig. 83), about 2/5 of shell length; whorls flat (Fig. 82), or slightly convex (Fig. 84); sutures not impressed (Fig. 82) or impressed (Fig. 84). Aperture D-shaped; outer lip simple and with orange color, varicose thickening within; parietal callus narrow, strongly twisted over columella.

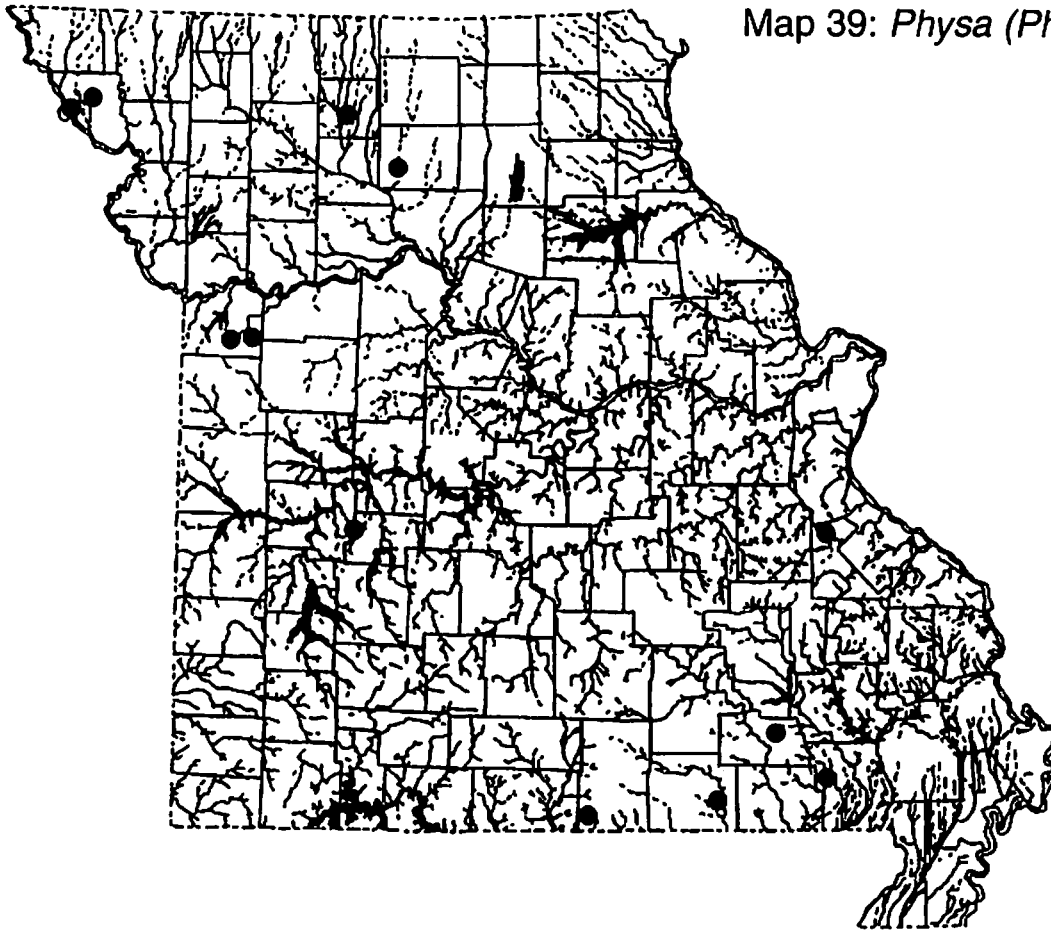
Distribution in Missouri:

This species is widely distributed in Missouri except for the southwest portion of the Ozark Region (Map 40).

Records:

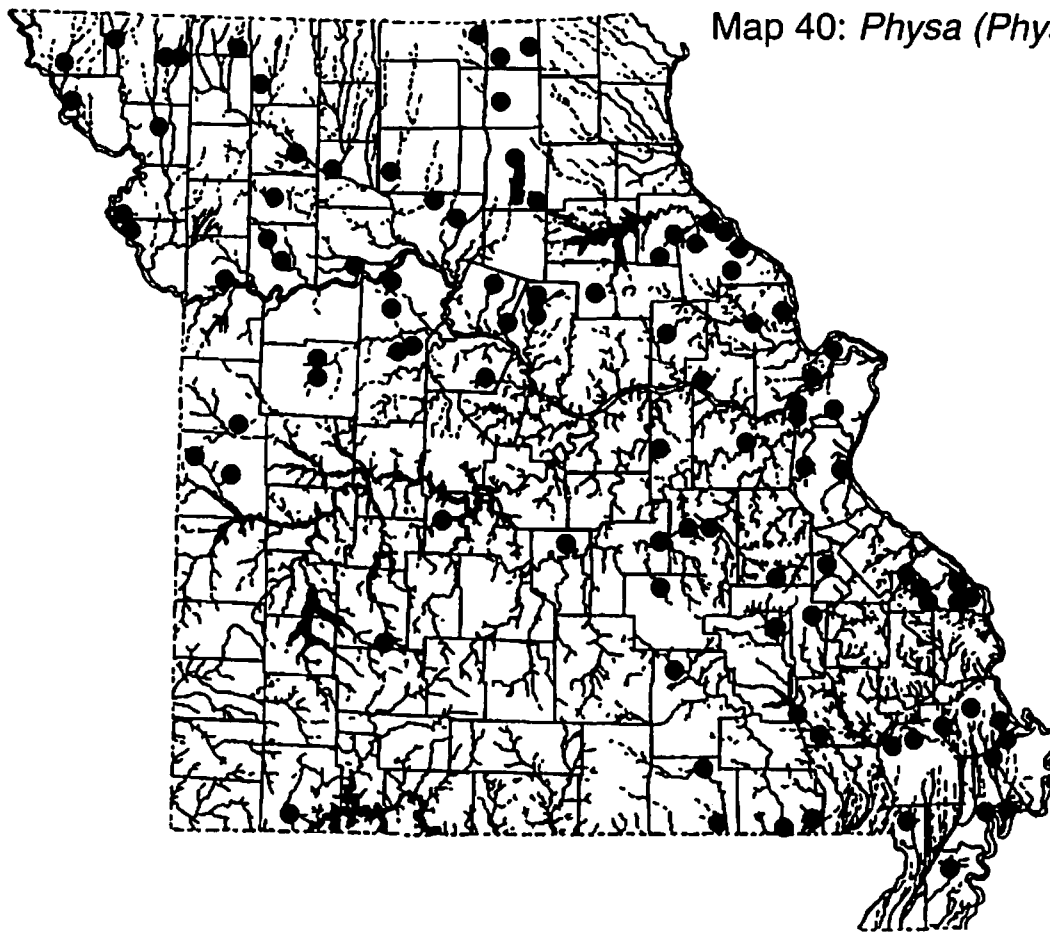
ADAIR COUNTY: 33001-ROADSIDE DITCH IN THOUSAND HILLS STATE PARK, T62NR16W Sec 01 SW4; ANDREW

Map 39: *Physa (Physodon) acuta*
Draparnand



COUNTY: 37172-ROADSIDE POOL ALONG MO Hwy 48, T60NR35W Sec 35 S/10 N; **ATCHISON COUNTY:** 36802-CREEK @ CO Hwy Z, T63NR41W Sec 04/09; **AUDRAIN COUNTY:** 36851-FISH BRANCH CREEK @ MO Hwy 15 & CO Hwy T, T52NR09W Sec 28; **BATES COUNTY:** 32296-POOL BELOW SMALL LAKE, T42NR33W Sec 20NE4/21NW4; 32301-POOL ALONG U.S. Hwy Bus. 71 & CO Hwy TT, T40NR31W Sec 10; 32300-TRIBUTARY OF MIAMI CREEK @ CO Hwy Y, T42NR33W Sec 29; 32553-UNNAMED CREEK ALONG U.S. Hwy Bus.71, T40NR31W Sec 03; **BOONE COUNTY:** 32546-DITCH @ MAIN ST. IN STURGEON MO, T51NR12W Sec 05; 31790-GORDON'S POND, T51NR12W Sec 28; **BUCHANAN COUNTY:** 35847-SUGAR LAKE IN LEWIS & CLARK STATE PARK, T55NR37W Sec 34 NW4NW4; **CALDWELL COUNTY:** 35889-BRUSHY CREEK @ CO Hwy F, T56NR28W Sec 36; 35885-POND IN BONANZA WILDLIFE AREA, T56NR27W Sec 33 NW4NW4; 35886-POND IN BONANZA WILDLIFE AREA, T56NR27W Sec 32 SW4NW4; **CAMDEN COUNTY:** 37177-RAIN WATER HOLLOW @ CO Hwy J, T38NR18W Sec 04; **CARROLL COUNTY:** 36478-CATTAIL BORROW PIT, T53NR23W Sec 34 SW4NE4; **CASS COUNTY:** 32304-POOL @ BRIDGE ON CO Hwy A, T43NR31W Sec 31; 32303-UNNAMED CREEK, T43NR31W Sec 33 NC; **CHARITON COUNTY:** 36871-ROADSIDE POOL (RP) @ CO Hwy

F, T54/55NR18W Sec 33; 37225-(RP) @ MO Hwy 05, T54/55NR18W Sec 33 SE4SW4; 36869-TRIBUTARY OF YELLOW CREEK, T56NR19W Sec 14 SC; **CLAY COUNTY:** 37193-POOLS B & D IN COOLEY LAKE WILDLIFE AREA, T51NR30W Sec 02 SE4; 32311-ROCK CREEK @ MO Hwy 92, T53NR31W Sec 30; **COOPER COUNTY:** 35998-TRIBUTARY OF MONITEAU CREEK, T46NR16W Sec 14 NW4C; **CRAWFORD COUNTY:** 37180-HUZZAH CREEK, T38NR03W Sec 23; 36982-MERAMEC RIVER, T38NR04W Sec 29 NW4NW4; **DAVISS COUNTY:** 35891-POND @ HOLMES BEND ACCESS, T59NR27W Sec 28 SE4NE4; **DENT COUNTY:** 36141-SPRING BRANCH CREEK, T35NR06W Sec 32 SE4NW4; **DUNKLIN COUNTY:** 37014-DRAINAGE DITCH, T23N09E Sec 24 SE4/25 NE4; **FRANKLIN COUNTY:** 33781-FLOOD PLAIN POOL @ UNION ACCESS, T43NR01W, Sec 26; **GASCONADE COUNTY:** 36942-INTERMITTENT STREAM IN CANAAN STATE FOREST, T42NR06W Sec 34 SW4NW4; **HARRISON COUNTY:** 32324-WEST FORK @ CO Hwy EE, T63NR29W Sec 07/08; **HOLT COUNTY:** 35807-ROADSIDE MARSH ALONG MO Hwy 111, T61NR40W Sec 02 NE4; 35844-SQUAW CREEK NATIONAL WILDLIFE REFUGE, T61NR38W Sec 30 NW4; **HOWARD COUNTY:** 35909-BONNE FEMME CREEK @ CO Hwy U, T52NR15W Sec 28; 35910-ROADSIDE POOL ALONG CO Hwy W, T50NR15W Sec 34; **HOWELL**

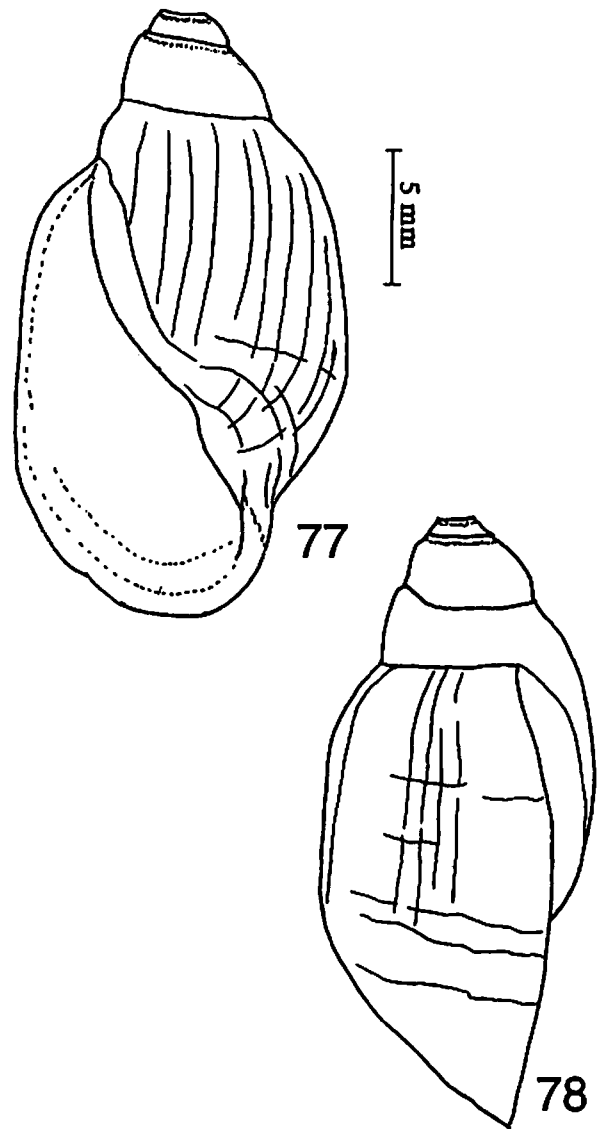


Map 40: *Physa (Physodon) anatina*
Lea 1864

COUNTY: 37202-BENNETT RIVER @ MO Hwy 142, T21NR10W Sec 02; **IRON COUNTY:** 34241-STOUTS CREEK @ MO Hwy 21, T33NR04E Sec 05; **JEFFERSON COUNTY:** 36013-JONES CREEK, T41NR03E Sec 15NW4SE4; 37209-UNNAMED CREEK, T41NR06E Sec 05 SW4SW4; **JOHNSON COUNTY:** 34784-CREEK @ 360 CHRISTOPHER ST., WARRENSBURG; 37051-HAZEL HILL LAKE, T47NR26W Sec 28 NE4SE4; **LINCOLN COUNTY:** 35834-B.K. LEACH WILDLIFE AREA (BKLWA), T50NR03E Surv 1693; 37232-(BKLWA), SWAMP ALONG N ROAD, T50NR03W Surv 1678 NE4NE4; 36894-BORROW PIT ALONG MO Hwy 47, T49NR01E Sec 30 NE4; **LINN COUNTY:** 37171-LOCUST CREEK @ U.S. Hwy 36, T57NR21W Sec 02 SW4/11 NW4; 35898-ROADSIDE POOL @ U.S. Hwy 36, T57NR22W Sec 12; **LIVINGSTON COUNTY:** 37199-SWAMP ALONG U.S. Hwy 36, T57NR24W Sec 17 SE4SW4; **MACON COUNTY:** 32338-BORROW PIT ALONG U.S. Hwy 36, T57NR15W Sec 18 NE4; 32438-ROADSIDE POOL ALONG U.S. Hwy 36, T57NR14W; **MISSISSIPPI COUNTY:** 33816-ROADSIDE POOL ALONG U.S. Hwy 60, T26NR15E Sec 18 NW4; 33819-UPPER BIG LAKE @ CO Hwy N, T27NR16E Sec 30; **MONTGOMERY COUNTY:** 36499-ROADSIDE POOL ALONG MO Hwy 19, T48NR05W Sec 05; **NEW MADRID COUNTY:** 38808-DONALDSON POINT STATE FOREST, T22NR15E Sec 06

NW4SE4; 37003-RANSBURGH HOLE ALONG CO Hwy WW, T23NR14E Sec 36 NE4NE4; 36997-STUMP HOLE, T23NR15E Sec 35 NE4NE4; **NODAWAY COUNTY:** 32314-OUTFALL POOL ALONG U.S. Hwy 136, T65NR37W Sec 13 C; 32317-POOL ALONG U.S. Hwy 136, T64NR35W Sec 15 SE4; 32318-POOL ALONG U.S. Hwy 136 T64NR34W Sec 17 SE4/20 NE4; **OREGON COUNTY:** 37218-ELEVEN POINT RIVER @ MO Hwy 19, T25NR03W Sec 31; 35965-MILL CREEK @ CO Hwy V, T22NR03W Sec 35; 36026-STREAM OUTSIDE PIPESPRING CAVE, T25NR03W Sec 09; **PEMISCOT COUNTY:** 34165-DRAINAGE DITCH @ I-55, T20NR12E Sec 19/24; **PERRY COUNTY:** 32808-CITY PARK CAVE, T35NR11E Sec 20; 39488-MEISNER CAVE, T35NR12E Sec 25; 38615-MYSTERY CAVE, T34NR11E Sec 09; 32800 & 39486-SEVENTYSIX CAVE, T35NR13E Sec 32; 32796-SOEHL CAVE T34NR12E Sec 04; 37009 & 37347-TOM MOORE CAVE, T35NR10E Sec 02; 32971 & 39493-STREILER CAVE IN PERRYVILLE; 32969-TAYLOR CAVE, T35NR10E Sec 12; **PETTIS COUNTY:** 37020-TRIBUTARY OF HEATH CREEK @ CO Hwy J, T47NR20W Sec 18; 37022-TRIBUTARY OF HEATH CREEK @ CO Hwy J, T47NR21W Sec 15; **PHELPS COUNTY:** 33824-UNNAMED SPRING @ MO Hwys 8 & 68; **PIKE COUNTY:** 34198-CLINTON SPRING ALONG MO Hwy 79, T54NR01W Sec 20 NW4NW4; 35825 & 36513-

CROOKED CREEK @ CO Hwy C, T54NR04W Sec 08; 37230-DU PONT RESERVATION, T55NR02/03W Sec 07 NW4NW4; 36515-LITTLE BUFFALO CREEK @ CO Hwy D, T53NR01W Sec 05; 37098-MISSISSIPPI RIVER, T54NR01W Sec 36 NE4NW4; 36517-RAMSEY CREEK @ MO Hwys D & WW, T52NR01W Surv 1762; 36902-TED SHANKS WILDLIFE AREA, T55NR02W Sec 28 SW4; **PLATTE COUNTY:** 35849-LITTLE BEAN MARSH, T54NR37W Sec 10 SC; 37192-ROADSIDE MARSH @ MO Hwy 45, T54NR37W Sec 30; **POLK COUNTY:** 36133-LITTLE SAC RIVER @ MO Hwy 13, T31NR22W Sec 09; **PULASKI COUNTY:** 34134-SPRING N OF PIQUET CAVE, T37NR11W Sec 04; **PUTNAM COUNTY:** 36874-REBEL COVE WILDLIFE AREA, T67NR16W Sec 33 NW4; **RALLS COUNTY:** 36505-SINKHOLE POND @ CO Hwys JJ & P, T54NR06W Sec 34; 36511-TRIBUTARY OF SPENCER CREEK, T54NR05W Sec 09 NE4; **RAY COUNTY:** 37196-BORROW PIT @ MO Hwy 13 & CO Hwy B, T52NR27W Sec 06; 35861-OXBOW LAKE IN CROOKED CREEK WILDLIFE AREA, T53NR28W, Sec 16 W2; 35883-PONDS IN CROOKED CREEK WILDLIFE AREA, T53NR28W Sec 16; **REYNOLDS COUNTY:** 34239-TRIBUTARY OF TAUM SAUK CREEK, T33NR03E Sec 25 NC; **RIPLEY COUNTY:** 36094-CURRENT RIVER, T21NR02E Sec 01 NC; 32586-ROADSIDE POOL ALONG MO Hwy 142, T22NR04E Sec 02 NW4NW4; 32764-ROADSIDE POOL ALONG MO Hwy 142, T22NR04E Sec 13; **ST. CHARLES COUNTY:** 35827-LAKE 22 IN BUSCH WILDLIFE AREA, T46NR02/03E Sec 19/24; 34166-MARAIS TEMPS CLAIR, T48NR05E Sec 24 NC; 36139-SMALL POND IN BUSCH WILDLIFE AREA, T46NR02E Sec 27; **ST. FRANCOIS COUNTY:** 34173-FLAT RIVER @ MO Hwy 32, T36NR04E Sec 13; **ST. LOUIS COUNTY:** 34215-CRYSTAL SPRING IN BABLER STATE PARK, T45NR03E Sec 29; 34216-RR CUT E OF DAVIDS SPRING, T44NR05E Sec 09 NE4; 32784-UNNAMED SPRING BESIDE MO Hwy 109, T44NR03E Sec 27 W2; **SALINE COUNTY:** 36861-GRAND PASS WILDLIFE AREA, T52NR22W Sec 21 EC; 35907-ROADSIDE POOL ALONG MO Hwy 41, T51NR21W Sec 28; 37224,35903-VAN METER STATE PARK, T52NR22W Sec 25 WC; **SCHUYLER COUNTY:** 32990-BORROW PIT @ CO Hwy Y, T64NR15W Sec 03; 32568-BRUSHY CREEK @ CO Hwy A, T65NR13W Sec 17 NE4; **SCOTT COUNTY:** 33817-PRICE ISLAND, T27NR16E Sec 05 WC; 33813-ROADSIDE POOL @ CO Hwy N, T28NR15E Sec 20; **SHANNON COUNTY:** 36111-CURRENT RIVER, T31NR05W Sec 34 SE4; **STODDARD COUNTY:** 33808-DUCK CREEK WILDLIFE AREA, T27NR09E Sec 04/05; 33725-ROADSIDE DITCH ALONG MO Hwy 51, T27NR09E Sec 08 NW4; 36985-POPLAR CREEK @ CO Hwy AB, T26NR11E Sec 03; 35914-TRIBUTARY OF CASTOR RIVER @ CO Hwy M, T27NR10E Sec 20; **WARREN COUNTY:** 36493-CLEAR BRANCH @ MO Hwy 94, T45NR03W Sec 04; **WASHINGTON COUNTY:** 34187-CUB CREEK, T35NR01W Sec 12 C;



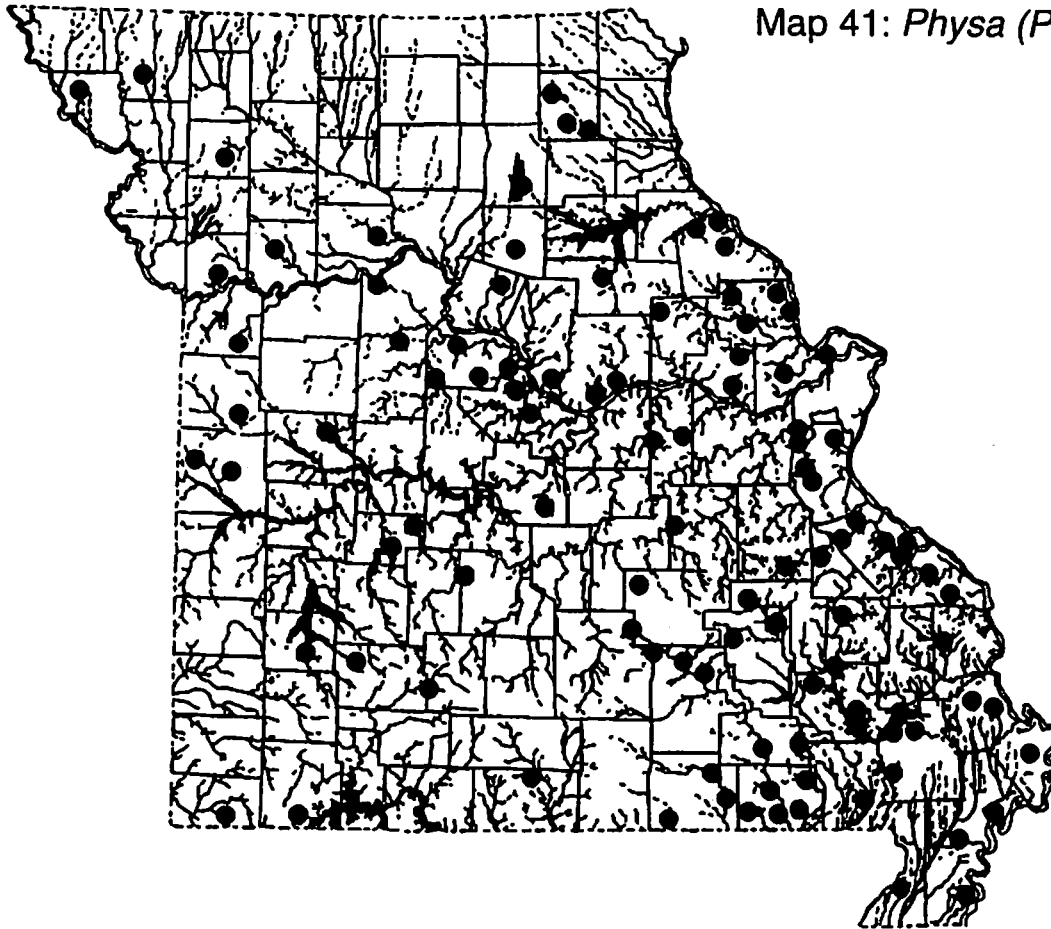
FIGS. 77-78. Shells of the Family Physidae FIGS. 77-78. *Physa (Physella) salina* Clench: Apertural and left-side views. UCM 38602 (apical tip broken). Shell length about 23mm.

WAYNE COUNTY: 32765-SMALL SPRING IN CLEARWATER LAKE CAMPGROUND, T28NR03E Sec 06 NW4; 33807-MARKHAM SPRING, T27NR04E Sec 23; **WORTH COUNTY:** 32323-MARTIN BRANCH @ CO Hwy M, T65NR30W Sec 28/33; 32321-SMALL DITCH ALONG CO Hwy M, T65NR30W Sec 26 S2.

Physa (Physodon) halei Lea 1864

Common name: Hale's physa

Figure 85-86



Map 41: *Physa (Physodon) halei*
Lea

Diagnostic characters:

Shell medium size and globose. Spire acutely-conic, short about 1/4 of shell length (Fig. 85), whorls slightly convex, suture slightly impressed (Fig. 86); body whorl large, wide and shouldered (Fig. 86). Aperture large, ovate (Fig. 85), inside of outer lip with white to light orange colored, varicose thickening, parietal callus moderately twisted over columella.

Distribution in Missouri:

Widely distributed in Missouri (Map 41).

Records:

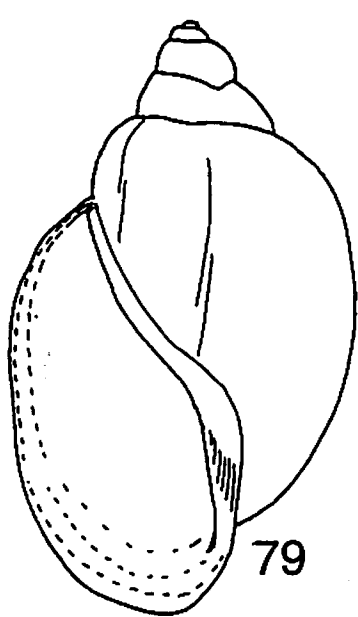
AUDRAIN COUNTY: 37223-LARGE LAKE IN R.M. WHITE II WILDLIFE AREA, T52NR09W Sec 01 NC; 36847-POND IN R.M. WHITE II WILDLIFE AREA, T52NR09W Sec 01 NW4; **BARRY COUNTY:** 29546-ROARING RIVER IN ROARING RIVER STATE PARK; **BATES COUNTY:** 38606-OUTFALL POOL, T42NR33W Sec 20 NE4/21 NW4; 32554-POOL @ CO Hwy TT & U.S. Bus. 71, T40NR31W Sec 10; **BOLLINGER COUNTY:** 33008-DUCK CREEK WILDLIFE AREA, T28NR09E; **BOONE COUNTY:** 35809-BRUSHY CREEK WILDLIFE AREA, T46NR11W Sec 18 SE4NW4; **BUTLER COUNTY:** 33814-ROADSIDE POOL ALONG U.S. Hwy

160, T24/25NR07E Sec 05/32; **CALLAWAY COUNTY:** 32996-DITCH IN MOKANE @ CO Hwy C, T45NR08W Sec 18; 32161-LITTLE AUXVASSE CREEK @ CO Hwy BB, T45NR10W Sec 36; **CAPE GIRARDEAU COUNTY:** 32548-TRIBUTARY OF LITTLE WHITEWATER RIVER @ CO Hwy UU, T31NR11E Surv 2299; **CARROLL COUNTY:** 36482-BIG CREEK @ MO Hwy 139, T53NR22W Sec 13/14; **CARTER COUNTY:** 36027-CANE CREEK @ U.S. Hwy 60, T26NR03E Sec 09; 34209-CURRENT RIVER, T26NR01E Sec 13 C; **CASS COUNTY:** 32292-GARDEN CITY LAKE, T44NR29W Sec 31 NW4; **CLAY COUNTY:** 35854-BORROW PIT N OF MO Hwy 210, T51NR31W Sec 23 SE4SE4; **COLE COUNTY:** 36003-NORTH MOREAU RIVER, T44NR14W Sec 12 SE4SE4; **COOPER COUNTY:** 35993-HUTCHINSON BRANCH, T47NR17W Sec 16 SW4NW4; 35995-MARSH ALONG CO Hwy A, T46NR19W Sec 36 SW4NE4; 35997-MONITEAU CREEK, T46NR16W Sec 23 SE4NC; 35994-TUT BRANCH, T47NR17W Sec 21 NW4SE4; **CRAWFORD COUNTY:** 36974-MERAMEC RIVER, T38NR05W Sec 27 SE4SW4; **DADE COUNTY:** 36126-SANS CREEK, T30/31NR27W Sec 05 NC/32 SC; **DALLAS COUNTY:** 37210-BENNETT SPRING BRANCH (BSB), T35NR17W Sec 31 NW4; 37211-(BSB), T35NR17W Sec 31; **DE KALB COUNTY:** 32337-PONY EXPRESS LAKE, T58NR31W Sec 35 SE4; **DENT COUNTY:** 36046-HYER

BRANCH, T35NR07W Sec 10 SW4SE4; 37217-PIGEON CREEK @ MO Hwy 119, T32NR07W Sec 22; **DUNKLIN COUNTY:** 32589-DRAINAGE DITCH @ CO Hwy A, T18/19NR09E Sec 04/33; **GASCONADE COUNTY:** 36945-CLEAR CREEK, T42NR06W Sec 18; 36946-RED OAK CREEK @ MO Hwy 28, T42NR05W Sec 13; **GREENE COUNTY:** 37214-CLEAR CREEK @ U.S. Hwy 160, T30NR23W Sec 18/19; **HENRY COUNTY:** 34270-WEST FORK OF TEBO CREEK, T42NR25W Sec 23; **HICKORY COUNTY:** 37069-MILL CREEK @ CO Hwy H, T37NR21W Sec 31; 37240-STARKES CREEK @ CO Hwy P, T38NR20W Sec 20; **HOLT COUNTY:** 37032-SQUAW CREEK NATIONAL WILDLIFE REFUGE, T61NR38W Sec 30; **HOWARD COUNTY:** 38610-MARSH @ MO Hwy 124, T50NR15W Sec 12; **IRON COUNTY:** 33791-POND, T34NR01W Sec 17; **JACKSON COUNTY:** 37045-HONKER POND, T47NR31W Sec 22 NW4NW4; 37042-PLOVER LAKE, T47NR31W Sec 15 NE4SW4; **JEFFERSON COUNTY:** 36015-BIG RIVER @ MORSE MILL ACCESS, T41NR03E Surv 1972; 37208-DRY CREEK @ CO Hwy Y, T40NR03E Sec 14; 36010-HILDA J. YOUNG MEMORIAL STATE FOREST, @ CO Hwy FF, T43NR03E Surv 1949; 36007-ROCK CREEK, T43NR05E Sec 33 NW4NW4; **KNOX COUNTY:** 32961-BORROW PIT ALONG MO Hwy 15, T62NR11W Sec 19; 32999-BORROW PIT ALONG CO Hwy TT, T60NR11W Sec 02; 32751-LITTLE FABIVUS RIVER @ MO Hwy 15, T61NR11/12W Sec 25 E/30 W; **LACLEDE COUNTY:** 37211 BENNETT SPRING BRANCH, T35NR17W Sec 31 SW4SW4; **LINCOLN COUNTY:** 35800-B.K. LEACH WILDLIFE AREA, T50NR03E Surv 1693 EC; 36896-LAKE IN WHITE MEMORIAL WILDLIFE AREA, T51NR01W Surv 1686 SW4; 36892-POND IN CUIVRE RIVER STATE PARK, T49NR01E Sec 07 NW4; 37188-PRAIRIE SLOUGH WILDLIFE AREA, T51NR02E Surv 1676 SW4; **MCDONALD COUNTY:** 36119-LITTLE SUGAR CREEK, T21NR31W Sec 05 SE4/08 NE4; **MACON COUNTY:** 32559-EAST FORK OF CHARITON RIVER @ U.S. Hwy 36, T57NR14W Sec 18; **MADISON COUNTY:** 32151-ST. FRANCIS RIVER, T33NR05E Sec 12 SE4; **MILLER COUNTY:** 33771-BARREN FORK @ MO Hwy 42, T39NR13W Sec 30; **MISSISSIPPI COUNTY:** 33749-ROADSIDE POOL ALONG MO Hwy 77, T25/26NR17E Sec 34 SW4; **MONITEAU COUNTY:** 36001-LITTLE MONITEAU CREEK, T45NR14W Sec 03 SE4SW4; 37205-MONITEAU CREEK, T47NR15W Sec 35 SW4C; **MONTGOMERY COUNTY:** 36843-LAKE WHITESELL IN MARSHALL I. DIGGS WILDLIFE AREA, T50NR06W Sec 31; 36846-LITTLE LOUTRE CREEK @ CO Hwy RA, T50NR06W Sec 32; **NEW MADRID COUNTY:** 37002-BOWMAN HOLE, T22NR15E Sec 16 NE4NW4; 32590-LITTLE RIVER @ MO Hwy 162, T21NR12E Sec 21/28; **NODAWAY COUNTY:** 40168-OUTFALL POOL BELOW POND ALONG U.S. Hwy 136, T65NR37W Sec 13 C; **OREGON COUNTY:** 38603-ELEVEN POINT RIVER (EPR), T23NR02W Sec 17 SE4 NC; 37195-(EPR), T23NR02W Sec 21 SE4NW4; 35874-

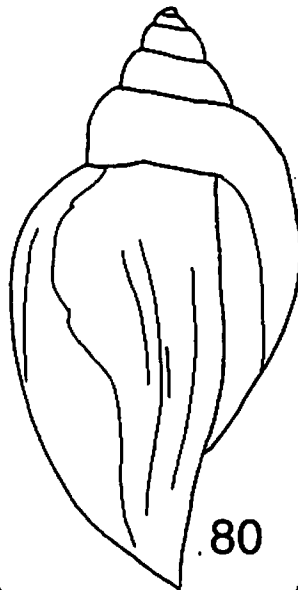
(EPR), T23NR02W Sec 20 NE4C; 33726-McCORMACK LAKE, T25NR04W Sec 24 SW4; 33737-TWO MILE CREEK, T22NR05W Sec 30 NW4NW4; 33729-WARM FORK OF SPRING RIVER, T22NR05W Sec 31 NE4; **OZARK COUNTY:** 38611-SPRING CREEK @ CO Hwy N, T24NR13W Sec 04; **PEMISCOT COUNTY:** 38607-ROADSIDE POOL ALONG I-55, T18NR13W Sec 33 C; **PERRY COUNTY:** 36037-CINQUE HOMME CREEK, T35NR11E Sec 28 NW4SW4; 40160-GERBER SPRING CAVE T33NR13E Sec 02; 36031-UIPUL CREEK @ U.S. Hwy 61, T34NR12E Sec 20; **PETTIS COUNTY:** 37024-HEATH CREEK @ U.S. Hwy 65, T48NR21W Sec 27; **PIKE COUNTY:** 37096-MISSISSIPPI RIVER, T54NR01W Sec 36 SW4; 36514-SUGAR CREEK @ MO Hwy 79, T55NR03W Sec 35; 36909-TED SHANKS WILDLIFE AREA, T55NR02W Sec 27 SC; **RANDOLPH COUNTY:** 32991-BORROW PIT, T53NR13W Sec 31 SE4; **RAY COUNTY:** 37197-PONDS IN CROOKED CREEK WILDLIFE AREA, T53NR28W Sec 16 W2; **REYNOLDS COUNTY:** 34261-EAST FORK OF BLACK RIVER, T33NR02E Sec 16 NW4; 33802-GRASSHOPPER CREEK, T32NR01W Sec 30 SC; **RIPLEY COUNTY:** 36082-CURRENT RIVER, T22NR02E Sec 23 C; 32585-CURRENT RIVER @ CO Hwy Y, T23NR02E Sec 15; 32580-EAST FORK OF FOURCHE CREEK @ MO Hwy 142, T22/23NR01E Sec 02/35; 32574-FOURCHE CREEK (FC) @ MO Hwy 142, T22NR01E Sec 04; 32577-(FC) @ T22NR01E Sec 05 SE4; 36097-TURKEY PEN HOLLOW CREEK, T22NR03E Sec 14 NW4NW4; 38608-LITTLE BLACK RIVER IN MUD PUPPY WILDLIFE AREA, T24NR03E Sec 23 C; **ST. CHARLES COUNTY:** 36523-LAKE 16 IN BUSCH WILDLIFE AREA (BWA); 36520-POND IN (BWA), T46NR03E Sec 19; 34170-WILLOWOOD LAKE @ CO Hwy H, T47NR05E Surv 3280; **ST. FRANCOIS COUNTY:** 37174-FLAT RIVER @ MO Hwy 32, T36NR04E Sec 13; 34179-TERRE BLEUE CREEK, T37NR05E Surv 2107 NE4; **ST. LOUIS COUNTY:** 34279-MERAMEC RIVER, T43NR03E Surv 1891; **STE. GENEVIEVE COUNTY:** 37181-CLOS CREEK @ MO Hwy Y, T38NR07E Surv 2088; 36041-DODGE CREEK @ U.S. Hwy 61, T37NR09E Surv 265; 36038-ESTABLISHMENT CREEK @ U.S. Hwy 61, T38NR07E Sec 13; 36045-FOURCHE A DU CREEK, T37NR06E Sec 02 NE4; 36043, RIVER AUX VASES CREEK, T37NR08E Sec 27 SE4SE4; 36042-SALINE CREEK @ CO Hwy N, T36NR09E

FIGS. 79-86. Shells of Family Physidae FIGS. 79-80. *Physa (Physodon) acuta* Draparnaud: Apertural and left-side views. UCM 37065. Shell length 11mm, 5 1/2 whorls. FIGS. 81-82. *Physa (Physodon) anatina* Lea: Apertural and left-side views. UCM 35851. Shell length 14.7mm, 5 7/8 whorls. FIGS. 83-84. *Physa (Physodon) anatina* Lea: Apertural and left-side views. UCM 36478. Shell length 15mm, 6 1/4 whorls. FIGS. 85-86. *Physa (Physodon) halei* Lea: Apertural and left-side views. UCM 36031. Shell length 11mm, 5 1/2 whorls.

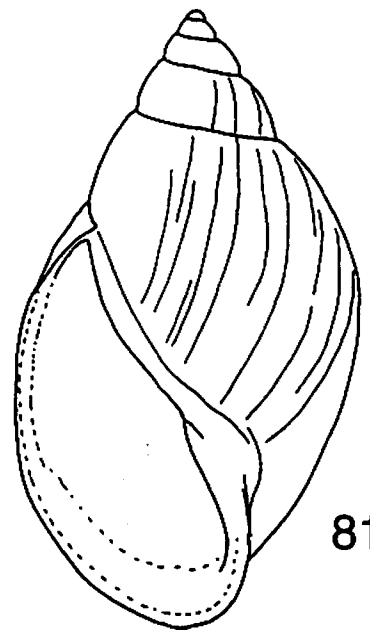


79

5 mm

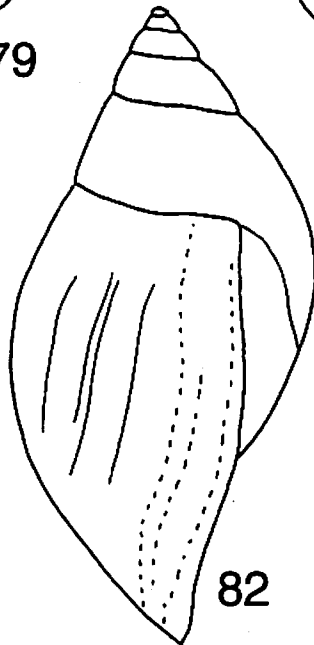


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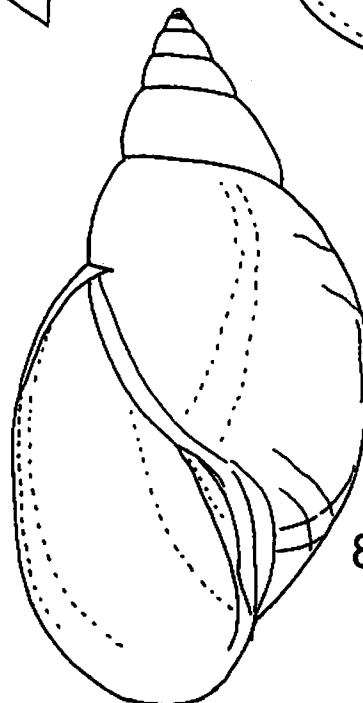


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5 mm

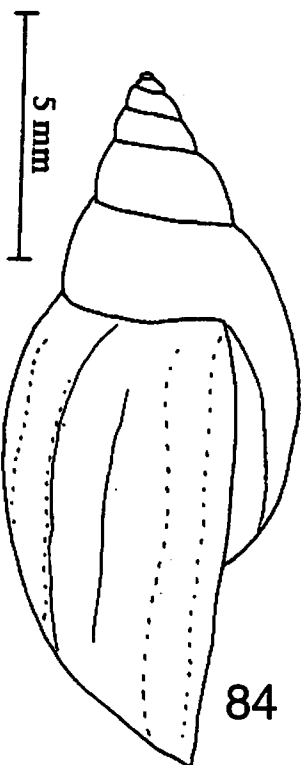


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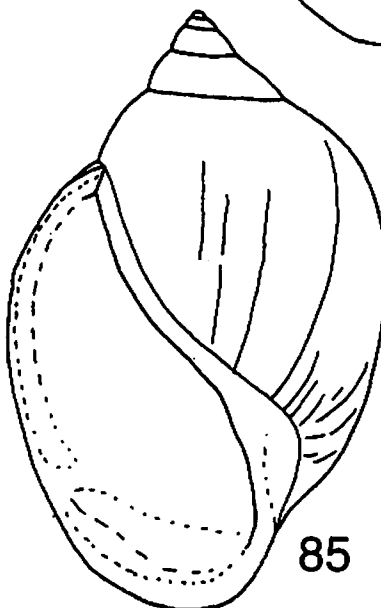
83

5 mm

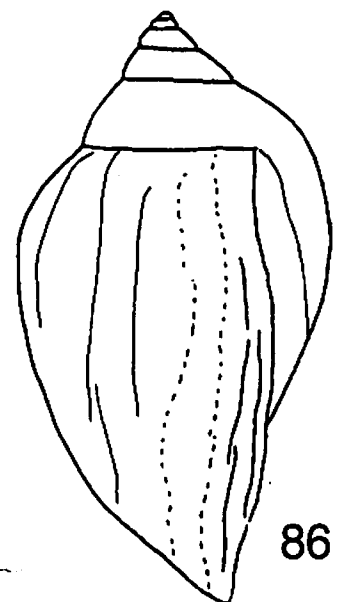


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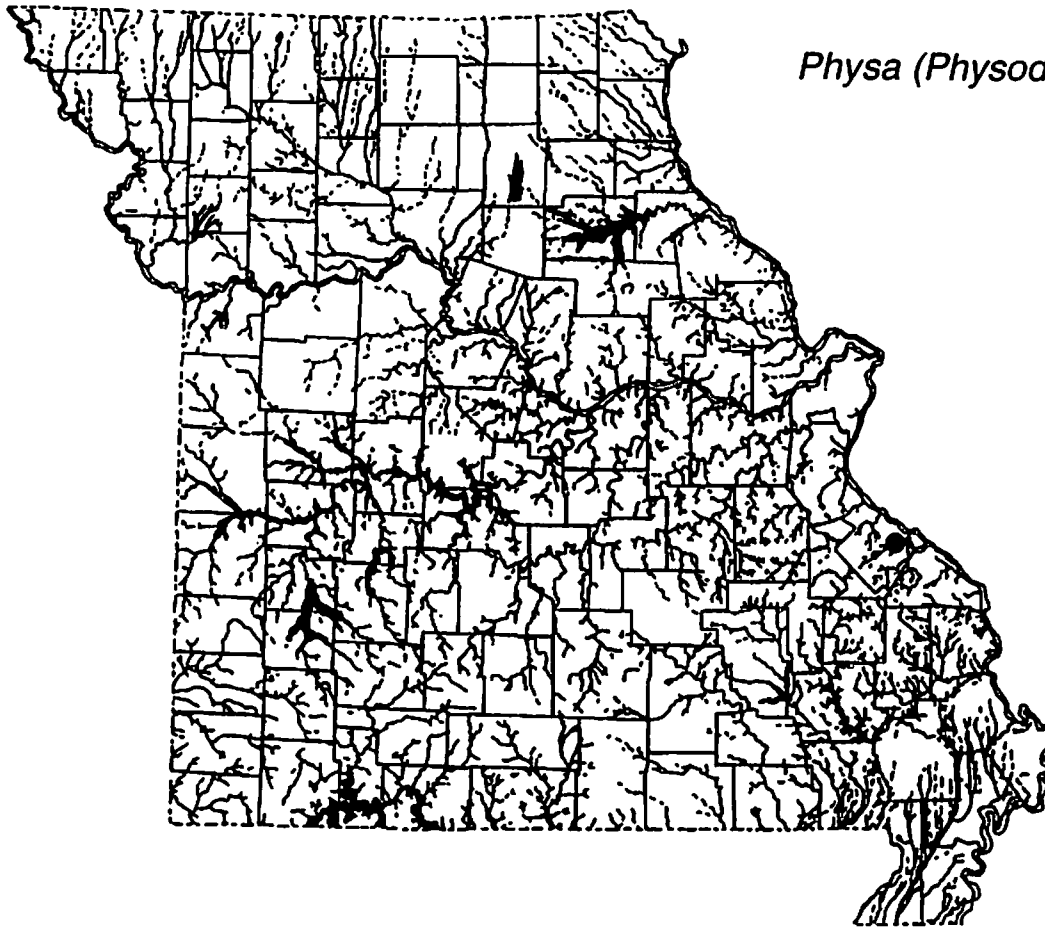
5 mm



85



86



Map 42:
Physa (Physodon) hendersoni
(Clench)

Surv 3060; **SALINE COUNTY:** 36863-MALTA BEND COMMUNITY LAKE, T51NR23W Sec 25 SW4; **SCOTT COUNTY:** 33822-DITCH CROSSING @ I-55, T28NR14E Surv 1014; 33811-POWERS ISLAND CHUTE, T28NR15E Sec 17 SW4; **SHANNON COUNTY:** 36104-CURRENT RIVER (CR), T31NR06W Sec 24 NW4NW4; 37213-(CR), T31NR05W Sec 28 SE4SW4; 36531-(CR) @ CAVE SPRING CAVE, T31NR05W Sec 21/28; 36076-PULLTITE SPRING, T30NR05W Sec 04 SE4SW4; 37112-ROUND SPRING BRANCH, T30NR04W Sec 20 NW4SE4; **STODDARD COUNTY:** 33721-DITCH @ ENTRANCE TO MINGO NATIONAL WILDLIFE REFUGE (MNWR), T27NR09E Sec 19 NW4; 33007-BLUFF POOL BETWEEN MUSEUM & FLATBANKS IN (MNWR); 36992-LICK CREEK @ MO Hwy 25, T26NR10E Sec 13; 35916-OTTER SLOUGH WILDLIFE AREA, T24NR09E Sec 17 SE4E; **WARREN COUNTY:** 36491-HOWARD BRANCH FORK, T45NR02W Sec 09 NE4; 36485-INDIAN CAMP CREEK, T47NR01W Sec 04 NE4; **WASHINGTON COUNTY:** 34184-CEDAR CREEK, T35NR03E Sec 06 SE4; **WAYNE COUNTY:** 36100-CEDAR CREEK @ U.S. Hwy 67, T30NR06E Sec 06; 32276, 32591 & 35929-LOST CREEK @ CO Hwy D, T28NR07E Sec 31; 34222-LOST CREEK, T27NR07E Sec 05 NE4NE4; 35935-RINGS CREEK @ CO Hwy FF, T29NR05E Sec 19; 34231-STANLEY CREEK, T27NR07E Sec 13 SE4; **WEBSTER COUNTY:** 35987-PANTHER CREEK @ CO

Hwy FF, T29NR18W Sec 19; **WRIGHT COUNTY:** 37204-TRIBUTARY OF JAMES RIVER @ CO Hwy V, T29NR17W Sec 24.

Remarks:

This species was originally reported by Lea (1864), from Alexandria, Louisiana. This species distinguishes itself from sympatric *Physa pomilia* by its shorter spire, larger aperture and more globose body whorl.

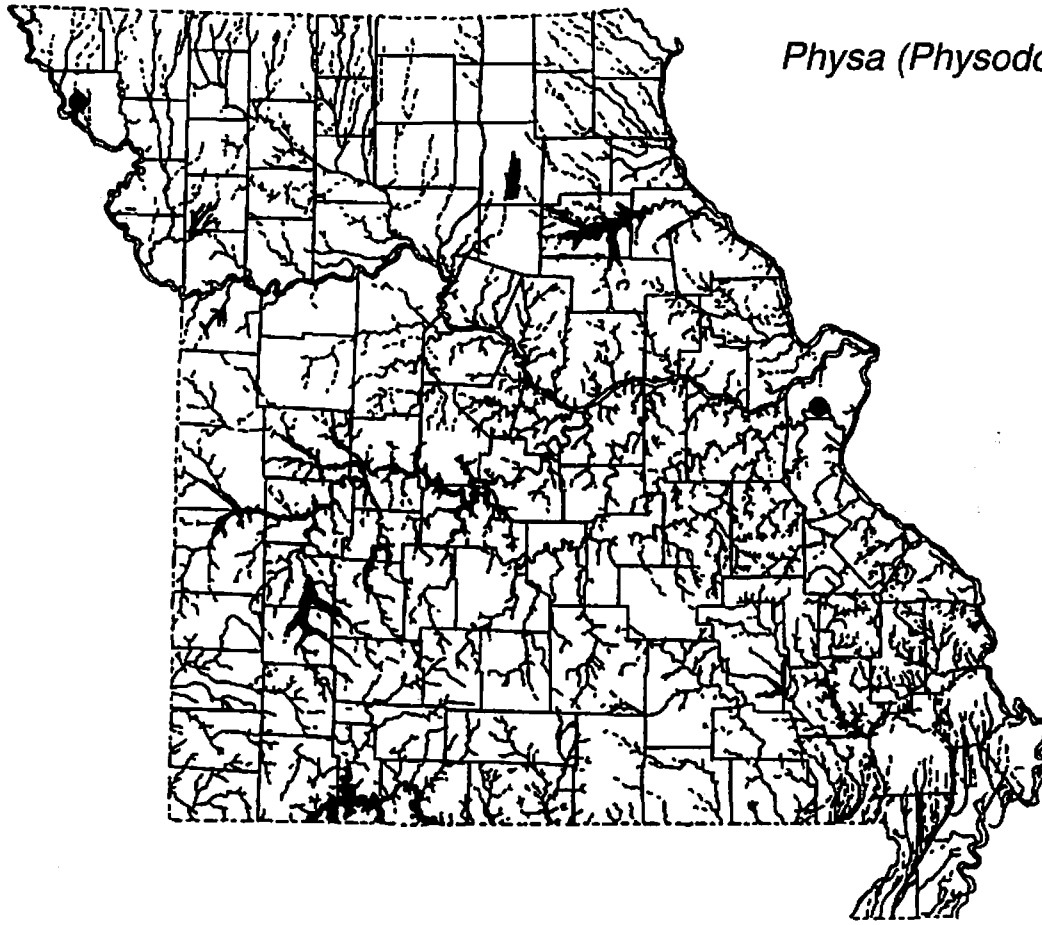
Physa (Physodon) hendersoni (Clench 1925)

Common Name: bayou physa

Figure 87-88

Diagnostic characters:

Shell medium, elongate ovate. Spire rather elongate, 1/2 of shell length (Fig. 87), whorls convex, suture impressed (Fig. 88), body whorl large and shouldered at base (Fig. 87). Aperture rather small and ovate; inside of outer lip with low white varicose thickening; parietal callus narrow and strongly twisted over columella (Fig. 87).



Map 43:
Physa (Physodon) peninsularis
(Pilsbry)

Distribution in Missouri:

Collected only from Ste. Genevieve County (Map 42).

Records:

STE. GENEVIEVE COUNTY: 38609-RIVER AUX VASES CREEK T37NR08E EC 27 SE4SE4.

Remarks:

This species was originally reported as a subspecies of *Physa pomilia* from Yemassee, Beaufort Co., South Carolina by Clench (1925) for those shells with an extremely high spire and a round aperture. Thompson (1984) also reported this species from Florida.

Physa (Physodon) peninsularis (Pilsbry 1899)

Common name: Davids Spring physa

Figures 89-90

Diagnostic characters:

Shell is small, elongated cylindrical. Spire acutely elongated, about 1/2 of shell length (Fig. 89), whorls convex, suture well impressed (Fig. 90). Aper-

ture large, round at base, outer lip simple and with thin white varicose thickening inside, parietal callus thin, moderately twisted over columella (Fig. 89).

Distribution in Missouri:

Found only in Holt and St. Louis counties near large rivers, an unusual distribution pattern (Map 43).

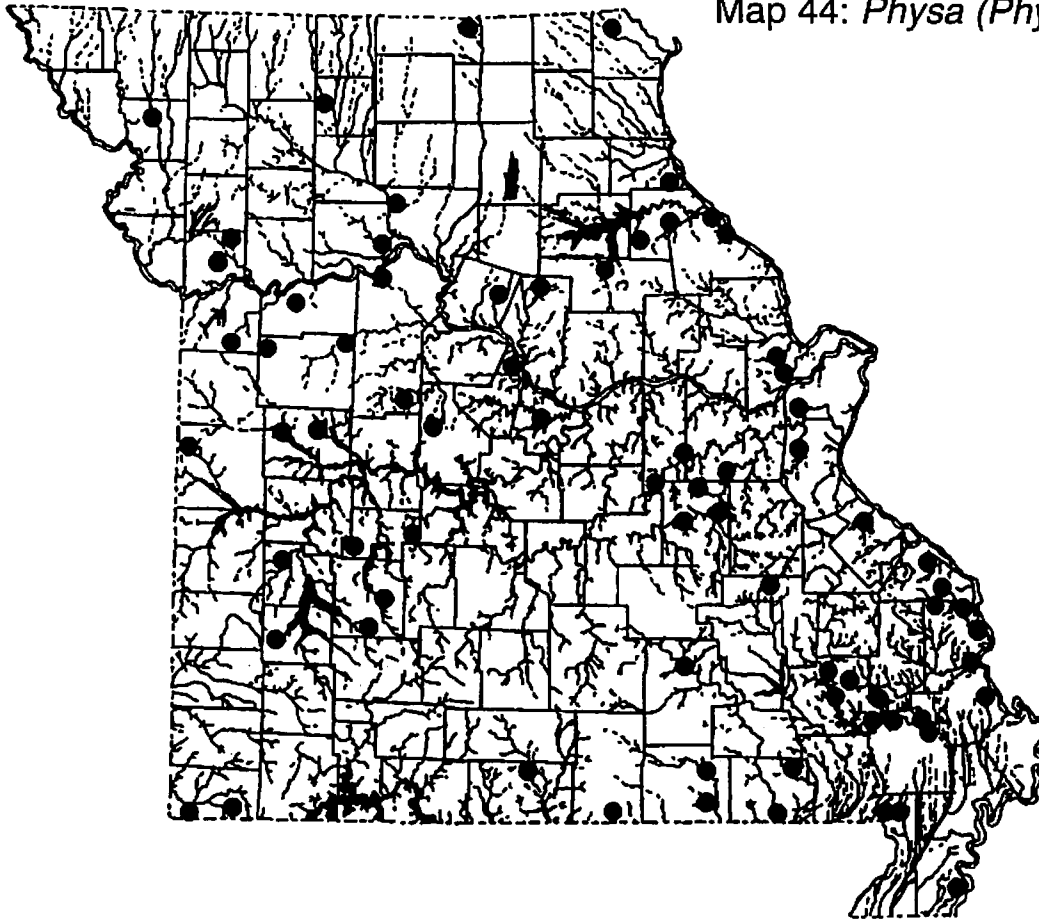
Records in Missouri:

HOLT COUNTY: 36697-SNOW GEESE POOL IN SQUAW CREEK NATIONAL WILDLIFE REFUGE. **ST. LOUIS COUNTY:** 35911-DAVIDS SPRING, T44NR05E Sec. 09 NE 4.

Remarks:

Rhoads (1899) listed *Physa heterostrophæ peninsularis* from the vicinity of Miami, Florida. Pilsbry (1899) commented "The small, slender, glossy *Physa* of peninsular Florida often goes under the name *P. pomilia* Contr., in collections. Recognizing that this was incorrect, I gave the MS. name '*P. heterostrophæ peninsulæ*' to the specimens collected at Miami by Mr. S.N. Rhoads. (this Journal, p 48). On comparing with Antillean forms I find that the species is *Physa cubensis* Pfr.,

Map 44: *Physa (Physodon) pomilia*
Conrad



described from western Cuba”.

After comparison of this species with the cotype of *Physa cubensis* (MCZ 73619) and Paraense's specimens (1987, figs. 1A & 1B), Missouri specimens do not conform with either of the above. Our specimens look more like a left-handed shell of *Fossaria peninsulae* (Walker 1908) (See Burch, 1989, p. 171, Fig. 576). Our Missouri specimens are provisionally called *Physa peninsularis* Pilsbry.

***Physa (Physodon) pomilia* Conrad 1834**

Common Name: glossy physa

Figures 91-94

Diagnostic characters:

Shell medium size, subfusiform, surface smooth in younger specimens and malleated in adult specimens (Fig. 94). Spire acutely-conic (Figs. 91, 93), 2/5 of shell length, whorls almost straight or slightly convex, suture impressed (Fig. 94) or not impressed (Fig. 92); body whorl large, round, (Fig. 92), or slightly shouldered (Fig. 94). Aperture large, outer lip simple and with a whitish varicose thickening within;

parietal callus weakly (Fig. 91), or strongly twisted (Fig. 93) over columella.

Distribution in Missouri:

Widely distributed in Missouri (Map 44).

Records:

ANDREW COUNTY: 35845-HADORN BRIDGE ACCESS, T60NR35W Sec 14 SW4; **AUDRAIN COUNTY:** 36848-LAKE IN R.M. WHITE WILDLIFE AREA, T52NR09W Sec 01 NC; **BATES COUNTY:** 38605-OUTFALL POOL, T42NR33W Sec 20/21; **BOONE COUNTY:** 31793-GORDON'S POND, T51NR09W Sec 01 NC; **CAPE GIRARDEAU COUNTY:** 32149-CREEK IN EGYPT MILLS, T32NR14E Sec 35; 32806-LANG SPRING, T33NR12E Sec 05; 33746-ROADSIDE POOL AT U.S. Hwy 61 & MO Hwy 74, T30NR13E; **CARROLL COUNTY:** 36864-ROADSIDE DITCH @ MO Hwy 41, T52NR21W Sec 03; **CEDAR COUNTY:** 34274-ALDER CREEK @ CO Hwy U, T35NR27W Sec 08; **CHARITON COUNTY:** 36866-POOL IN YELLOW CREEK WILDLIFE AREA, T55NR21W Sec 14 NW4NW4; **CLARK COUNTY:** 36883-LAKE IN FOX VALLEY STATE FOREST, T66NR08W Sec 21; **CLAY COUNTY:** 32305-TRIBUTARY OF FISHING RIVER @ MO Hwy 33, T52NR31W Sec 15; 32307-CARROLL CREEK @ MO Hwy 92,

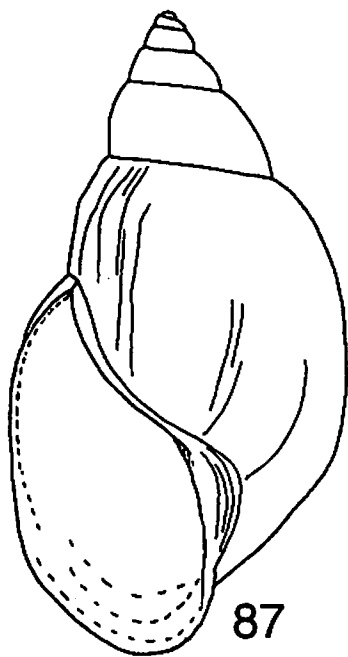
T53NR30W Sec 30; **COLE COUNTY:** 36005-SOUTH MOREAU CREEK, T43NR13W Sec 15 NE4NW4; **CRAWFORD COUNTY:** 36935-LITTLE BOURBEUSE RIVER @ CO Hwy H, T40NR04W Sec 25; 36978-MERAMEC RIVER, T38NR04W Sec 18 C; 37747-ONONDAGA CAVE STATE PARK, T39NR03W Sec 34 NE4; **DADE COUNTY:** 36129-HORSE CREEK, T31NR28W Sec 23 NE4/26 NE4; **DUNKLIN COUNTY:** 37012-UNNAMED STREAM ALONG MO Hwy 53, T22NR09E Sec 33 SE4NE4; 36995-WILHELMINA STATE FOREST @ CO Hwy DD, T22NR08E Sec 27/34; **FRANKLIN COUNTY:** 32977 & 33785-ELM SPRING IN MERAMEC STATE PARK, T40NR02W Sec 13 NW4; **GASCONADE COUNTY:** 36939-BOURBEUSE RIVER, T40NR06W Sec 23 C; 36940-BOURBEUSE RIVER, T40NR06W Sec 14 NW4; 32964-RED OAK CREEK, @ CO Hwy T, T42NR04W Sec 29; **GRUNDY COUNTY:** 32330-SUGAR CREEK @ MO Hwy 146, T62NR25W Sec 29; **HENRY COUNTY:** 34268-SWAMP/LAKE @ MO Hwy 7, T42NR27W Sec 22 NC; 34270-WEST FORK OF TEBO CREEK, T42NR25W Sec 23; **HICKORY COUNTY:** 37060-WEAUBLEAU CREEK @ CO Hwy OO, T36NR23W Sec 20; 37239-LITTLE NIANGUA RIVER @ CO Hwy BB, T37NR20W Sec 26; **HOWARD COUNTY:** 36852-MARSH ALONG MO Hwy 124, T50NR15W Sec 12; **HOWELL COUNTY:** 37201-SOUTH FORK OF SPRING RIVER, T21NR08W Sec 05 EC; **IRON COUNTY:** 34192-POND @ MO Hwy 32, T35NR02E Sec 33 NW4; **JACKSON COUNTY:** 37236-BIG CREEK, T47NR31W Sec 23 SE4SE4; 37034-WATERFOWL MARSH, T47NR31W Sec 23 SE4SE4; **JEFFERSON COUNTY:** 36011-DUTCH CREEK @ CO Hwy NN, T42NR03E Sec 22/27; **JOHNSON COUNTY:** 37029-EDWIN A. PAPE LAKE, T48NR24W Sec 29 NE4SE4; 37056-LAKE IN R & M PERRY MEMORIAL WILDLIFE AREA (RMPMWA), T47NR24W Sec 03 SE4NW4; 37054-POND IN (RMPMWA), T48NR24W Sec 33 NW4NW4; 37050-SOUTH FORK OF BLACKWATER RIVER, @ U.S. Hwy 50, T47NR28W Sec 19; **LAFAYETTE COUNTY:** 36470-R.L.D.S. LAKE, T49NR28W Sec 15/22; **MCDONALD COUNTY:** 35818-DEER CREEK, T21NR33W Sec 26 SW4; 40114-LITTLE SUGAR CREEK 1.5 MI N OF JANE; **MARION COUNTY:** 37170-ROADSIDE DITCH @ U.S Hwy 24, T57NR04W; **MONITEAU COUNTY:** 37205-MONITEAU CREEK, T47NR15W Sec 35 SW4C; **MORGAN COUNTY:** 37077-HAW CREEK, @ MO Hwy 52, T42NR19W Sec 06; **OREGON COUNTY:** 31784-FREDERICK CREEK @ CO Hwy Y, T22NR03W Sec 12; 37234-TRIBUTARY OF ELEVEN POINT RIVER, T24NR02W Sec 18; **OZARK COUNTY:** 37159-SPRING CREEK @ CO Hwy N, T24NR13W Sec 04; **PEMISCOT COUNTY:** 34161-ROADSIDE POOL ALONG I-55, T18NR13E Sec 33 C; **PERRY COUNTY:** 32803-INDIAN CREEK CAVERNS SPRING, T34NR12E Sec 17; 32794-MERTZ CAVE, T35NR11E Sec 16; 40158-SOEHL CAVE, T34NR12E Sec 04; **PETTIS COUNTY:** 37028-KAHS-BOGER PARK WILDLIFE AREA, T44NR20W Sec 15; **PIKE COUNTY:**

37102-MISSISSIPPI RIVER, T54NR01W Sec 21 SE4; 37231-POOL IN TED SHANKS WILDLIFE AREA, T55NR02W Sec 18 EC; **POLK COUNTY:** 34265-POMME DE TERRE RIVER @ MO Hwy 32, T33NR22W Sec 11; 37215-TRIBUTARY OF LITTLE SAC RIVER @ MO Hwy 215, T32NR23W Sec 19/30; **PUTNAM COUNTY:** 37228-REBEL COVE WILDLIFE AREA, T67NR16W Sec 33 NW4; **RALLS COUNTY:** 36509-JUG RUN CREEK, T54NR05W Sec 08 NE4; 36502-LICK CREEK @ CO Hwy D, T53NR07W Sec 22; **RIPLEY COUNTY:** 36080-CURRENT RIVER (CR) T22H R02E Sec 04 SE4; 36089-CR, T22NR02E Sec 36 SE4NW4; 35956-LITTLE BLACK RIVER IN MUD PUPPY WILDLIFE AREA, T24NR03E Sec 23; **ST. CHARLES COUNTY:** 36525-PITZMAN LAKE IN BUSCH WILDLIFE AREA, T46NR02E Sec 27; 36497-POOL ALONG U.S. Hwys 40/61, T46NR02E Surv 1641 W; 36528-SPRING TO LAKE 33 IN BUSCH WILDLIFE AREA, T46NR02E Sec 23; **ST. LOUIS COUNTY:** 37342-MERAMEC RIVER, T44NR03E Sec 25 E2; 32564-ROCKWOOD SPRING, T44NR03E Sec 10 SE4; **STE. GENEVIEVE COUNTY:** 34172-CLOS CREEK @ CO Hwy Y, T38NR07E Surv 2088; **SALINE COUNTY:** 40162-DENNIS SPRING, T49NR20W Sec 12 NW4; 36860-GRAND PASS WILDLIFE AREA, T52NR22W Sec 16 EC; **SCOTT COUNTY:** 37007-ALBRECHT CREEK, T29NR14E Sec 13 NW4; 33809-POOL BETWEEN MISSISSIPPI RIVER & LEVEE, T29NR15E Sec 31 NE4; **SHANNON COUNTY:** 36080-CURRENT RIVER, T22NR02E Sec 04 SE4; 34202 & 37179-ROUND SPRING BRANCH, T30NR04W Sec 20 NW4; **STODDARD COUNTY:** 34152-BLUFFSIDE POOL BELOW MUSEUM IN MINGO NATIONAL WILDLIFE REFUGE (MNWR) 34155-MINGO RIVER IN (MNWR); 36029-TRIBUTARY OF CASTOR RIVER, T27NR10E Sec 19; 36989-WILLIAMS CREEK @ CO Hwy AB, T26NR11E Sec 11; **WAYNE COUNTY:** 32279-BEAR CREEK @ CO Hwy C, T29NR07E Sec 19; 37200-CEDAR WILMORE CREEK, @ U.S. Hwy 67, T30NR06E Sec 07; 35931-HOLLIDAY CREEK @ CO Hwy D, T28NR05E Sec 12; 32596 & 35926-McGEE CREEK @ CO Hwy TT, T28NR08E Sec 20; 35921-STANLEY CREEK @ CO Hwy Z, T27NR08E Sec 18.

Remarks:

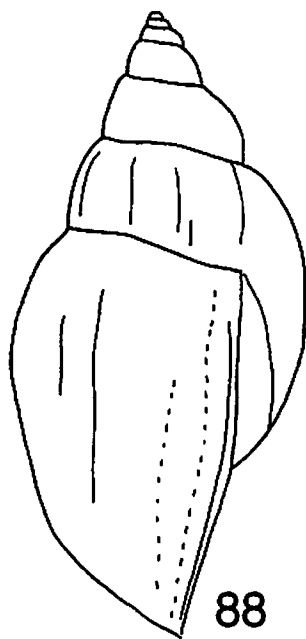
This species was described by Conrad (1834) from Alabama and may be widely distributed over all the

FIGS. 87-94. Shells of Family Physidae FIGS. 87-88. *Physa (Physodon) hendersoni* Clench: Apertural and left-side views. UCM 38609. Shell length 14mm, 6 1/2 whorls. FIGS. 89-90. *Physa (Physodon) peninsularis* Pilsbry: Apertural and left-side views. UCM 35911. Shell length 10mm, 6 whorls. FIGS. 91-92. *Physa (Physodon) pomilia* Conrad: Apertural and left-side views. UCM 37201. Shell length 10.4mm, 5 3/4 whorls. FIGS. 93-94. *Physa (Physodon) pomilia* Conrad: Apertural and left-side views. UCM 31793 (apical lip broken).

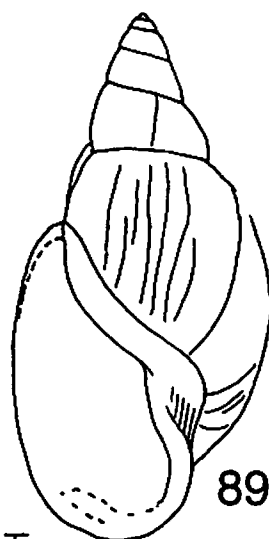


87

5 mm

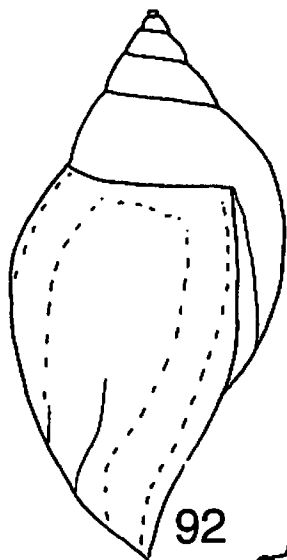


88

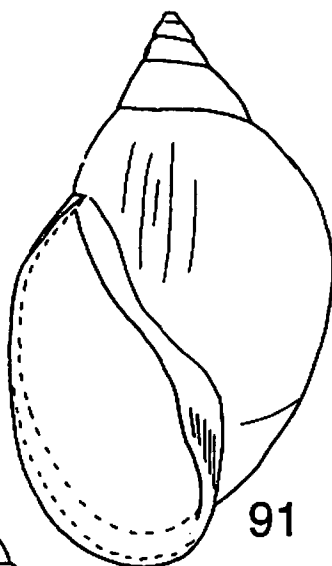


89

5 mm

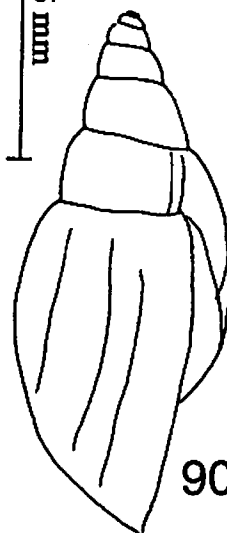


92

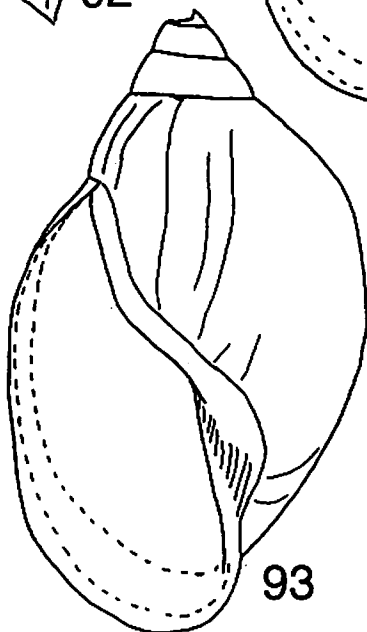


91

5 mm

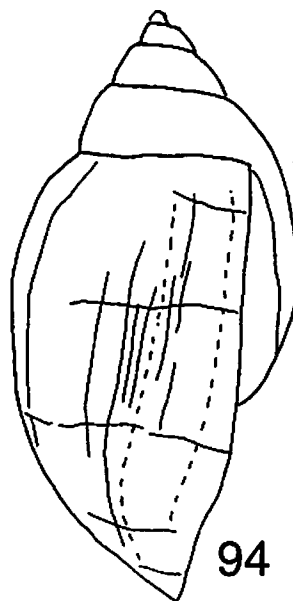


90

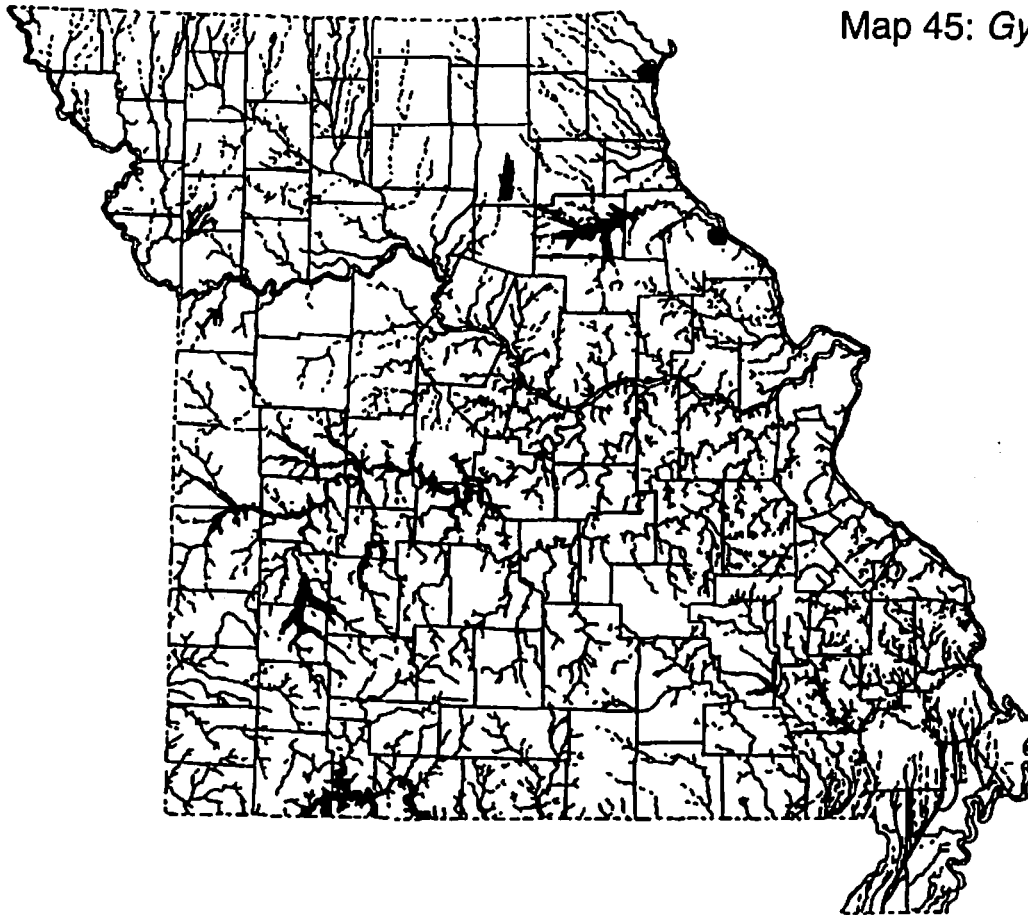


93

5 mm



94



Map 45: *Gyraulus deflectus*
(Say)

southeastern continental United States. In this report, it is distinguished from *Physa anatina* by having a more acute spire and a white varicose thickening within the outer lip. Based on the holotype, *Physa inflata* Lea 1841 from Virginia may be a junior synonym of *P. pomilia*.

FAMILY PLANORBIDAE RAFINESQUE 1815

Family characters:

Shell sinistral and hyperstrophic-discoidal, small to large in size, thin or thickened; surface smooth or with moderate to fine collabral sculpture. Color brownish horn. Body whorls round or may be carinate apically or basally.

GENUS *GYRAULUS* "AGASSIZ" CHARPENTIER 1837

Genus characters:

Shell small, depressed planorbiform; pale to dark brown color. Both upper and undersides depressed. Whorls smooth or spirally ridged, periphery round, obtusely angulated, or carinated.

Gyraulus deflectus (Say 1824)

Common name: flexed gyro

Figures 95-97

Diagnostic characters:

Shell (Fig. 96) surface malleated, aperture widely lunate with simple margin. Periphery round; under side flat (Figs. 95, 97).

Distribution in Missouri:

Occurs in the upper Mississippi River Region (Map 45).

Records:

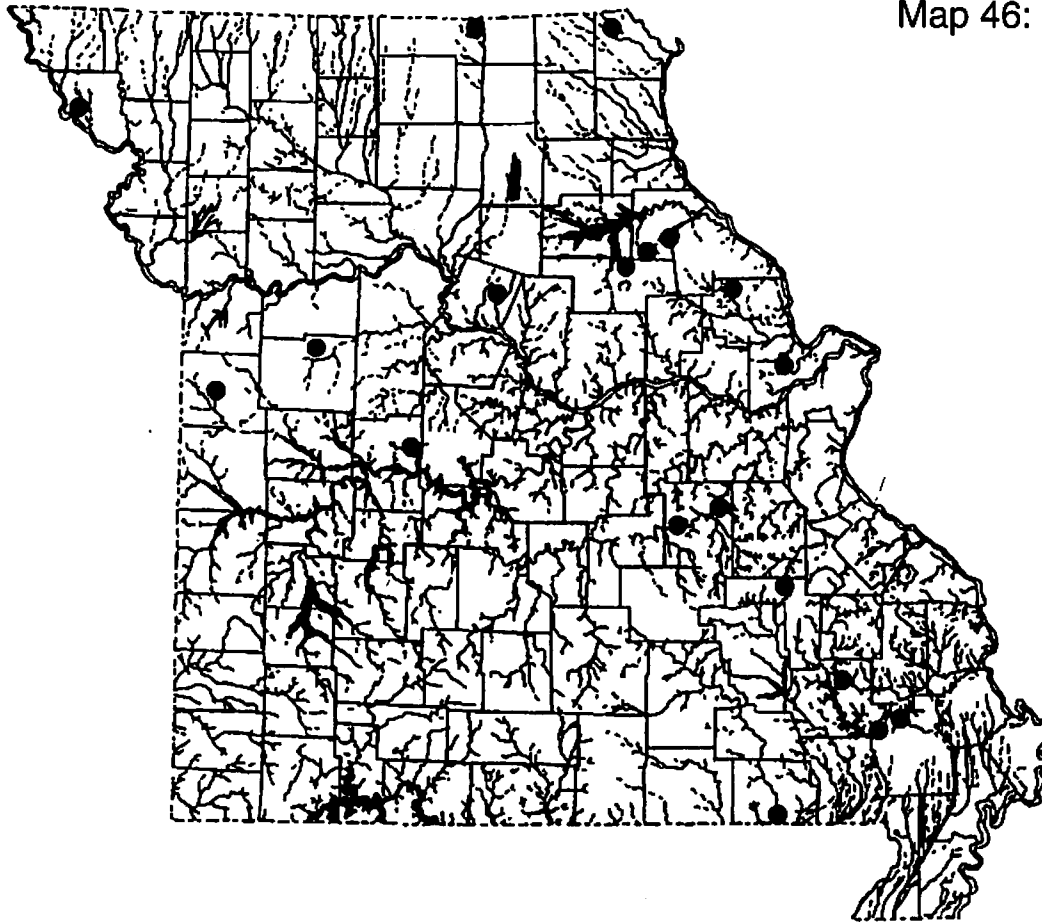
CLARK COUNTY: 36888-BUCK RUN WILDLIFE AREA, T63NR06W Sec 14 NC; PIKE COUNTY: 36913-TED SHANKS WILDLIFE AREA, T55NR02W Sec 22 C.

Gyraulus parvus (Say 1817b)

Common name: ash gyro

Figures 98-100

Map 46: *Gyraulus parvus*
(Say)



Diagnostic characters:

Shell small (up to 7mm in diameter), whorls increasing rapidly: upper side moderately depressed; under side slightly convex; periphery round. Aperture round and margin simple. Surface smooth and semi-transparent.

Distribution in Missouri:

Widely distributed in Missouri (Map 46).

Records:

AUDRAIN COUNTY: 36850-R.M. WHITE II WILDLIFE AREA, T52NR09W Sec 01 NC; **BENTON COUNTY:** 37076-BUFFALO CREEK MARSH, T41NR20W Sec 12 SE4NW4; **CASS COUNTY:** 38640-LAKE LUNA, T45NR31W Sec 34 SW4; **CLARK COUNTY:** 36885-LAKE IN FOX VALLEY STATE FOREST, T66NR08W Sec 21; **CRAWFORD COUNTY:** 36981-MERAMEC RIVER (MR), T38NR04W Sec 18 C; 37106-(MR), T38NR04W Sec 29 NE4NE4; 36980- (MR), T38NR04W Sec 18 C; 37748-ONONDAGA CAVE STATE PARK, T39NR03W Sec 34 NE4NE4; **HOLT COUNTY:** 36694-PELICAN POOL IN SQUAW CREEK NATIONAL WILDLIFE REFUGE, T61NR38W Sec 30 NW4; **HOWARD COUNTY:** 36854-MARSH ALONG MO Hwy 124, T50NR15W Sec 12 WC; **IRON**

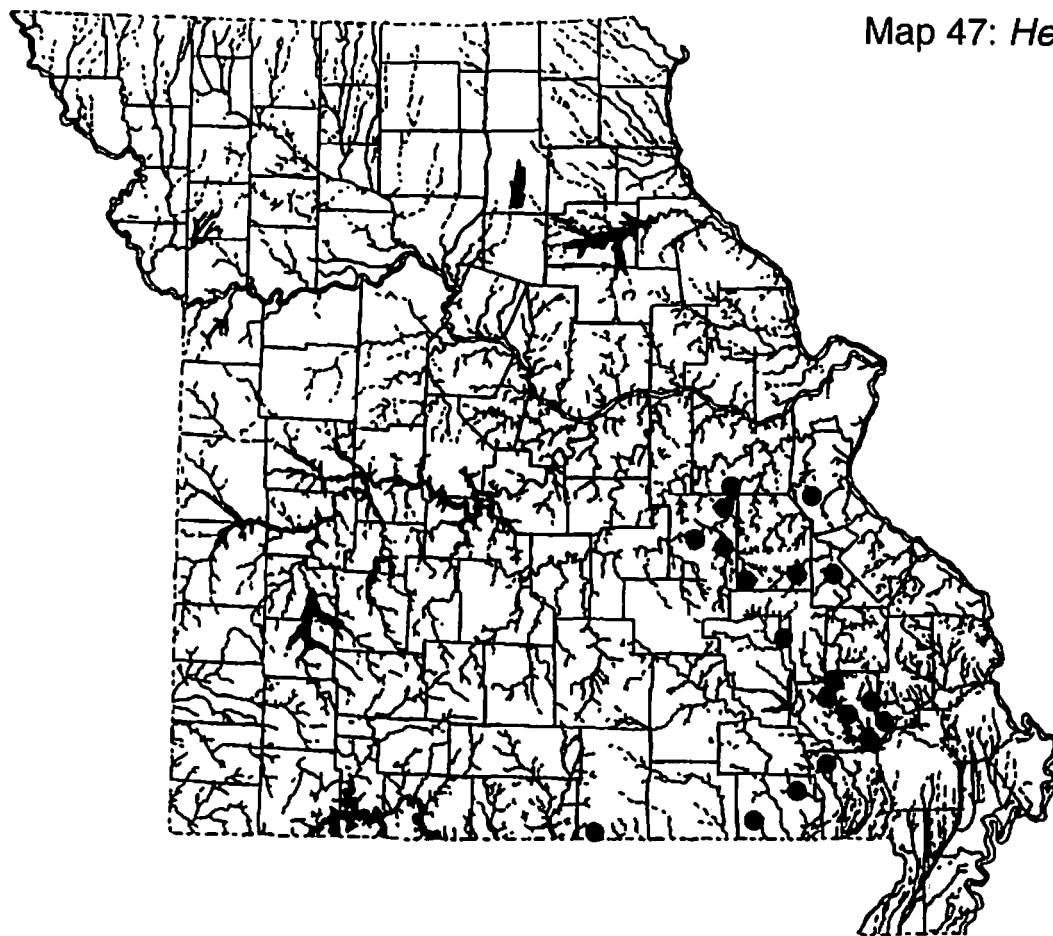
COUNTY: 33793 & 34194-POND ALONG MO Hwy 32, T35NR02E Sec 33 NE4; **JOHNSON COUNTY:** 37053-HAZEL HILL LAKE, T47NR26W Sec 28 NE4; **LINCOLN COUNTY:** 36898-WHITE MEMORIAL WILDLIFE AREA, T51NR01W Surv 1686 SW4; **PUTNAM COUNTY:** 36877-REBEL COVE WILDLIFE AREA, T67NR16W Sec 33 NW4; **RALLS COUNTY:** 36504-LICK CREEK @ CO Hwy D, T53NR07W Sec 22; 36507-SINKHOLE POND BESIDE CHURCH @ CO Hwys JJ & P, T54NR06W Sec 34 EC; **RIPLEY COUNTY:** 36087-CURRENT RIVER, T22NR02W Sec 25 SW4NE4; **ST. CHARLES COUNTY:** 36498-POOL ALONG U.S. Hwys 40/61, T46NR02E Surv 1641 W2; 36527-PITZMAN LAKE IN BUSCH WILDLIFE AREA; **STODDARD COUNTY:** 37178-DUCK CREEK WILDLIFE AREA, T27NR09E; 34157-MINGO RIVER IN MINGO NATIONAL WILDLIFE REFUGE, **WAYNE COUNTY:** 34237-DRY CREEK @ MO Hwy 143, T29NR05E Surv 849.

GENUS *HELISOMA* SWAINSON 1840

Genus characters:

Shell planorbiform; few whorls and increasing rapidly, upper side depressed, umbilicus funicular and aperture suddenly expanded and thickened.

Map 47: *Helisoma anceps*
(Menke)



***Helisoma anceps* (Menke 1830)**

Common name: two-ridge rams-horn

Figures 101-103

Diagnostic characters:

Shell small to medium size, relatively high, light horn to chestnut in color. Upper side deeply depressed, under side slightly depressed. Whorls distinctly carinated on both upper and undersides. Whorls with fine collabral sculpture. Aperture large and expanded.

Distribution in Missouri:

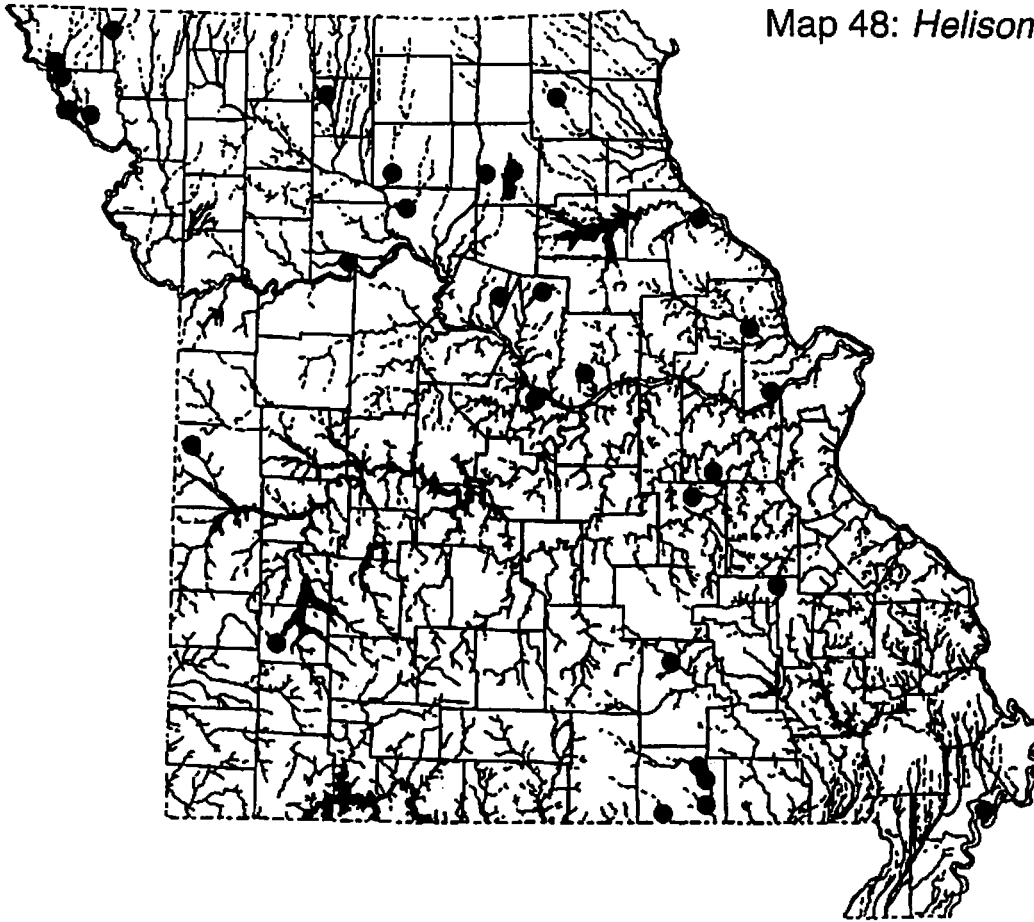
Found only in the eastern half of the Ozark Region (Map 47).

Records:

BUTLER COUNTY: 36028-GOOSE CREEK @ U.S. Hwy 60, T25NR05E Sec 4; **CRAWFORD COUNTY:** 32551-MERAMEC RIVER, T40NR02W Sec 24 C; 36980-MERAMEC RIVER, T38NR04W Sec 18 C; 34146-HUZZAH CREEK, T38NR03W Sec 23; **FRANKLIN COUNTY:** 33786-ELM SPRING IN MERAMEC STATE PARK, T40NR02W Sec 11 NE4; **HOWELL COUNTY:** 35978-BENNETT RIVER @ MO Hwy 142, T21NR10W Sec 02;

JEFFERSON COUNTY: 36019-DRY CREEK @ CO Hwy Y, T40NR03E Sec 14; **REYNOLDS COUNTY:** 34240-TAUM SAUK CREEK, T33NR02E Sec 25 NC; **RIPLEY COUNTY:** 32578-FOURCHE CREEK @ MO Hwy 142, T22NR01E Sec 05; 32581-EAST FORK OF FOURCHE CREEK @ MO Hwy 142, T22/23NR1E, Sec 2/35; 35958-LITTLE BLACK RIVER IN MUD PUPPY WILDLIFE AREA, T24NR03E Sec 23 C; **ST. FRANCOIS COUNTY:** 34176-FLAT RIVER @ MO Hwy 32, T36NR04E Sec 13 SE4; 34180-TERRE BLEUE CREEK, T37NR05E Surv 2107 NE4; **WASHINGTON COUNTY:** 34189-COURTOIS CREEK, T36NR01W Sec 32 C; 34263-MILL CREEK @ CO Hwy M, T36NR03E Sec 22; **WAYNE COUNTY:** 34228-BEAR CREEK @ CO Hwy C, T29NR07E Sec 19; 34233-BIG CREEK IN SAM BAKER STATE PARK, T30NR05E Sec 28 C; 34236-DRY CREEK @ MO Hwy 143, T29NR05E Surv 849; 35932-HOLLIDAY CREEK @ CO Hwy D, T28NR06E Sec 12; 34224-LOST CREEK (LC), T27NR07E Sec 05 NE4; 34226-(LC), T27NR07W, Sec 03; 35930-(LC) T27NR07E Sec 31 NC; 32597 & 35927-McGEE CREEK @ CO Hwys TT & P, T28NR08E Sec 20; 32593, & 35923-STANLEY CREEK @ CO Hwy Z, T27NR08E Sec 18 WC.

Map 48: *Helisoma subcrenatum*
(Carpenter)



***Helisoma subcrenatum* (Carpenter 1857)**

Common name: rough rams-horn

Figures 104-106

Diagnostic characters:

Shell large, relatively low in height, usually reddish brown. Both upper and under sides slightly depressed, whorls rounded and not carinated on either side. Aperture broadly lunate.

Distribution in Missouri:

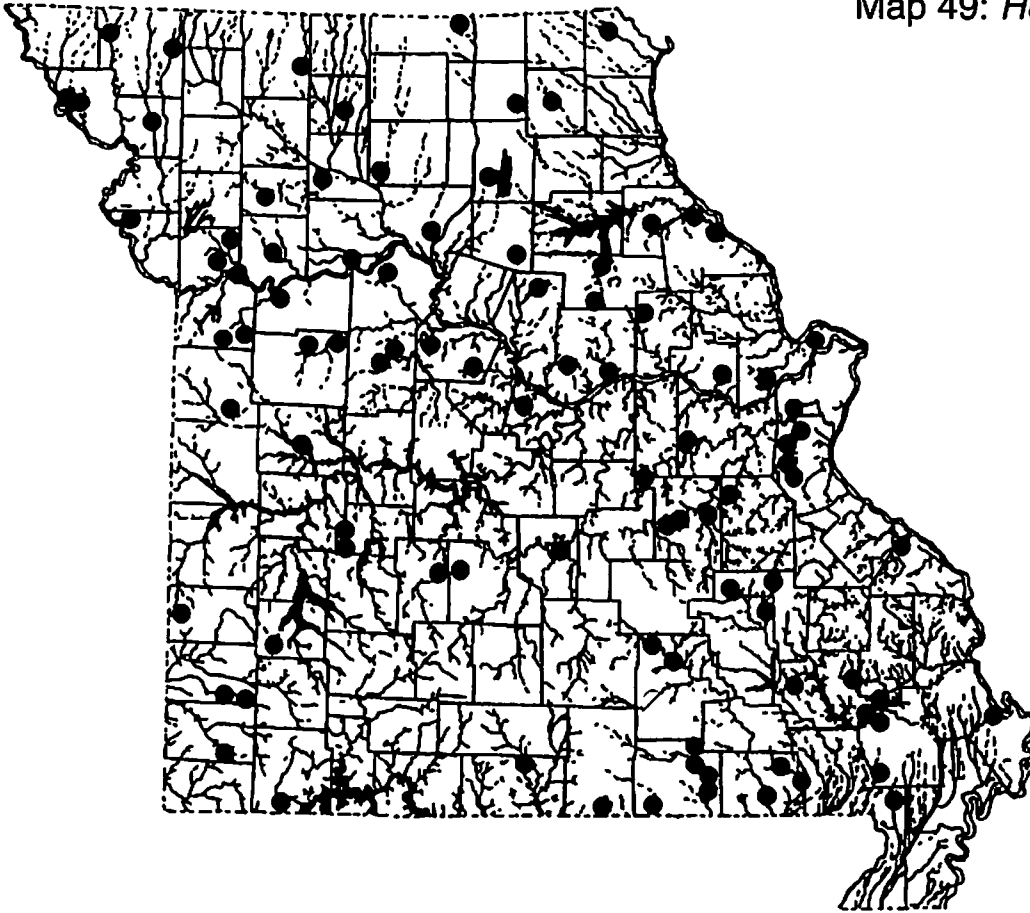
As widely distributed throughout Missouri as *Helisoma trivolvis* but less common in occurrence (Map 48).

Records:

ATCHISON COUNTY: 36801-CREEK @ CO Hwy Z, T63NR41W Sec 04/09; **BATES COUNTY:** 32297-OUTFALL POOL, T42NR33W Sec 20 NE4/21 NW4; **BOONE COUNTY:** 31791-GORDON'S POND, T51NR12W Sec 28; **CALLAWAY COUNTY:** 32160-MIDDLE RIVER, T46NR10W Sec 02 SE4; **CARROLL COUNTY:** 36476-ROADSIDE DITCH, T52NR23W Sec 17 NE4; **CHARITON COUNTY:** 35840-ROADSIDE POOL @ CO Hwy CC,

T55NR20W Sec 03 SE4; **COLE COUNTY:** 36006-BINDER LAKE, T45NR13W Sec 36 SW4NE4; **CRAWFORD COUNTY:** 36936-LITTLE BOURBEUSE RIVER @ CO Hwy C, T40NR04W Sec 25; **DADE COUNTY:** 36130-HORSE CREEK, T31NR28W Sec 23 SE4/26 NE4; **FRANKLIN COUNTY:** 33787-ELM SPRING IN MERAMEC STATE PARK, T40NR02W Sec 11 NE4; **GRUNDY COUNTY:** 32331-SUGAR CREEK @ MO Hwy 146, T62NR25W Sec 29; **HOLT COUNTY:** 35808-ROADSIDE MARSH @ MO Hwy 111, T61NR40W Sec 02 NE4NE4; 36796-ROADSIDE MARSH @ U.S. Hwy 159, T61NR40W Sec 33 NE4; 36799-DRAINAGE DITCH, T63NR41W Sec 24 SE4SE4; 37017-SQUAW CREEK NATIONAL WILDLIFE REFUGE, T61NR38W Sec 30; **HOWARD COUNTY:** 36853-MARSH @ MO Hwy 124, T50NR15W Sec 12 WC; **IRON COUNTY:** 33792-POND @ MO Hwy 32, T34NR01W Sec 17 C; **KNOX COUNTY:** 31788-BORROW PIT @ MO Hwy 15, T62NR11W Sec 19 SW4; **LINCOLN COUNTY:** 36895-BORROW PIT @ MO Hwy 47, T49NR01E Sec 30 NE4; **LINN COUNTY:** 32443-LOCUST CREEK @ U.S. Hwy 36, T57NR21W Sec 02 SW4/11 NW4; **MCDONALD COUNTY:** 40125-INDIAN CREEK 1 MI E OF ERIC; NE4; **MACON COUNTY:** 32339-BORROW PIT @ U.S. Hwy 36, T57NR15W Sec 18; 32560-EAST FORK OF CHARITON RIVER, T57NR14W Sec 18 NW4; **NEW MADRID COUNTY:** 36999-STUMP HOLE, T23NR15E Sec 35 NE4NE4;

Map 49: *Helisoma trivolvis*
(Say)



NODAWAY COUNTY: 32315-OUTFALL POOL @ U.S. Hwy 136, T65NR37W Sec 13 C; **OREGON COUNTY:** 35870-ELEVEN POINT RIVER (EPR), T23NR02W Sec 17 SE4NC; 36970-(EPR) T24NR02W Sec 20 SW4C; 31785-FREDERICK CREEK @ CO Hwy Y, T22NR03W Sec 12; 35969-SPRING RIVER, T21NR05W Sec 05 SE4; **PIKE COUNTY:** 36900-POOL S OF HEADQUARTERS IN TED SHANKS WILDLIFE AREA (TSWA), T55NR02W Sec 16/17; 36903-(TSWA), T55NR02W Sec 28 SC; 36910-POOL BY ROADSIDE (TSWA), T55NR02W Sec 27 SC; **ST. CHARLES COUNTY:** 34168-MARAIS TEMPS CLAIR, T48NR05E Sec 24 NW4NE4; 35831-LAKE 34 IN BUSCH WILDLIFE AREA (BWA), T46NR03E Sec 19; 36521-POND ACROSS ROAD FROM LAKE 35 IN (BWA), T46NR03E Sec 19; 35828-SMALL POOL BETWEEN LAKE 35 & ROAD IN (BWA), T46NR03E Sec 19; **SHANNON COUNTY:** 36078-PULLTITE SPRING, T30NR05W Sec 04 SE4SW4.

Helisoma trivolvis (Say 1817b)
Common name: marsh ramshorn
Figures 107-109

Diagnostic characters:

Shell tall and medium sized, usually light brown.

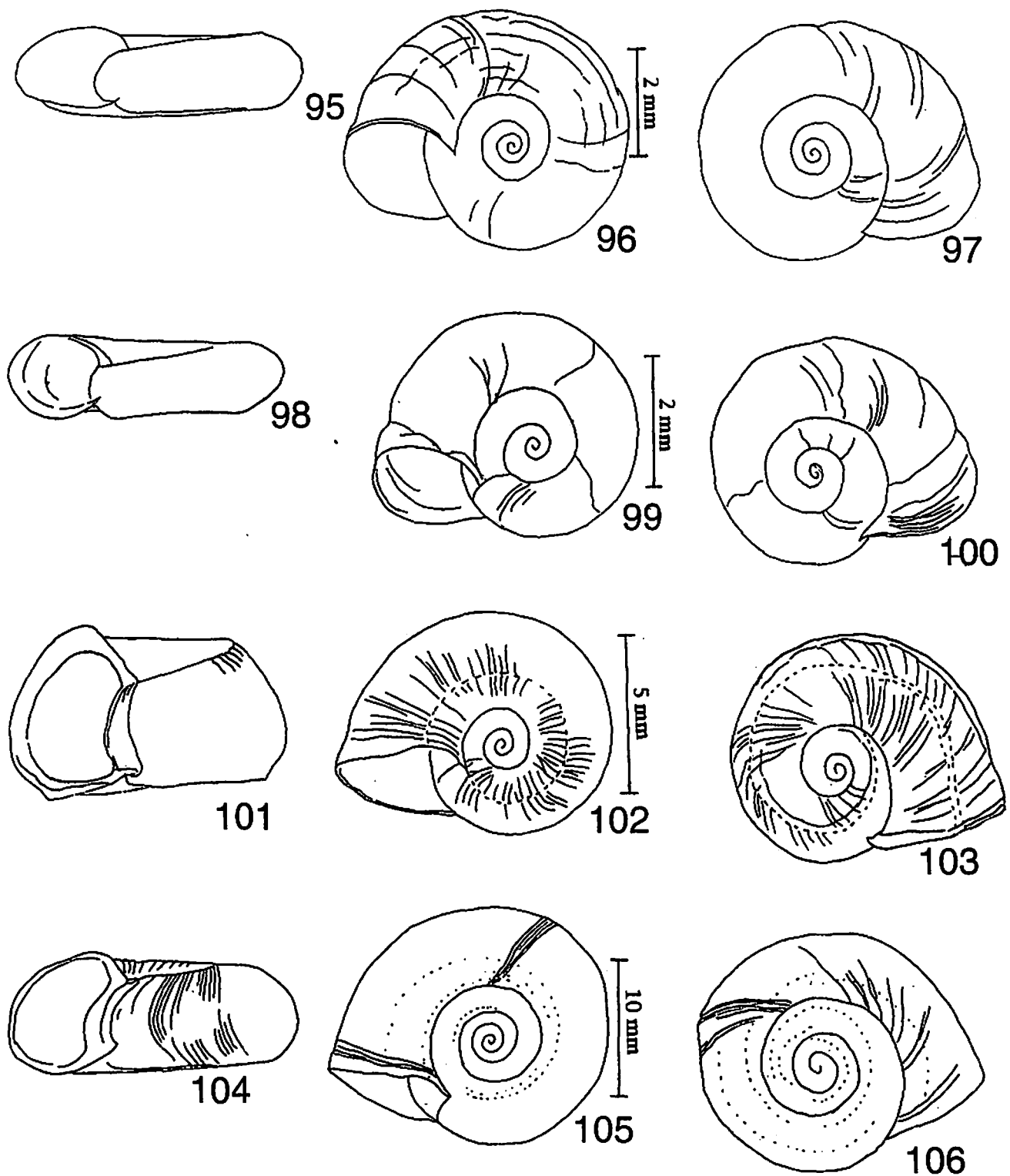
Upper side moderately depressed and carinated; underside little depressed and rounded, not carinated. Whorls with strong collabral sculpture. Aperture large, round or lunate.

Distribution in Missouri:

Widely distributed throughout Missouri (Map 49).

Records:

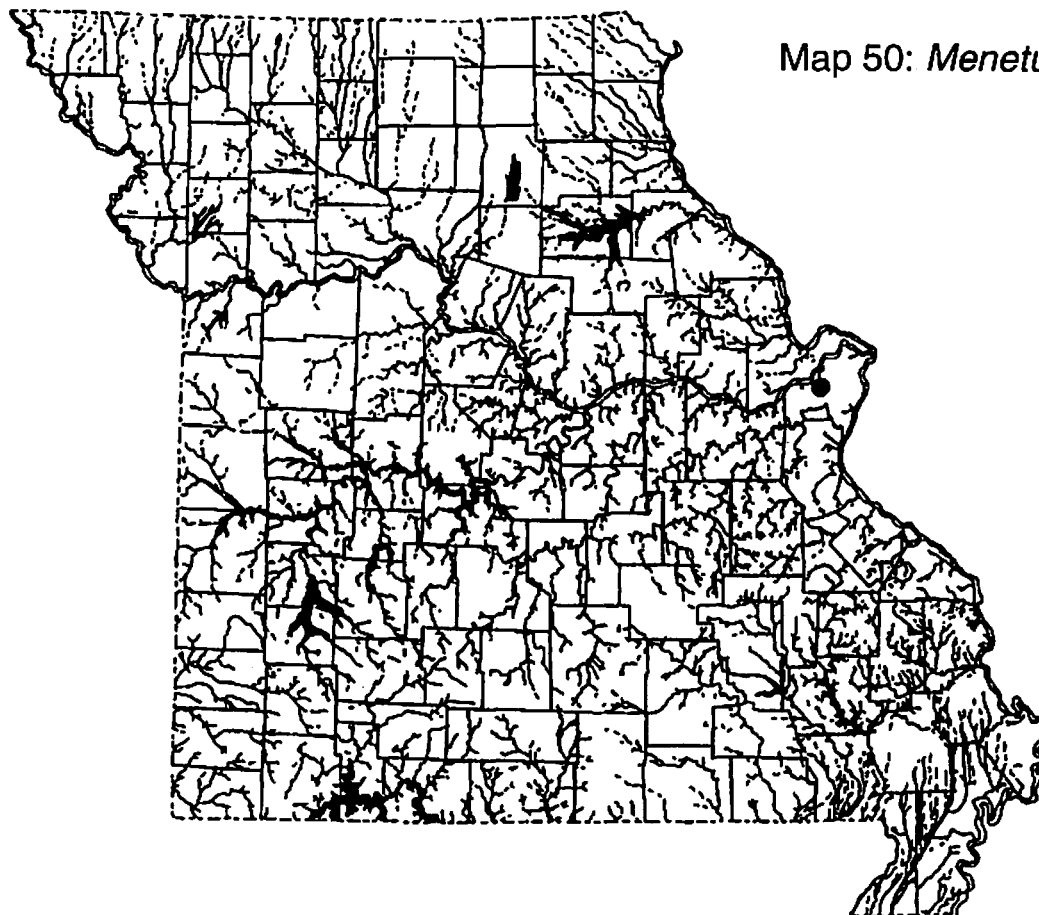
ADAIR COUNTY: 33002-BORROW PIT ALONG MO Hwy 6, T62NR13W Sec 30; **ANDREW COUNTY:** 32558-ROADSIDE POOL @ CO Hwy C, T60NR35W Sec 35 S/10 N; 35846-HADORN BRIDGE ACCESS, T60NR35W Sec 14; **AUDRAIN COUNTY:** 36849-R.M. WHITE II WILDLIFE AREA, T52NR09W Sec 1 NC; 36501-ROADSIDE POOL @ MO Hwy 54, T50NR07W Sec 14 SW4; **BARRY COUNTY:** 29545-ROARING RIVER IN ROARING RIVER STATE PARK; **BARTON COUNTY:** 31815-NICHOLS CREEK IN PRAIRIE STATE PARK, T32NR33W Sec 16; **BOLLINGER COUNTY:** 33009-DUCK CREEK WILDLIFE AREA, T28NR09E; **BOONE COUNTY:** 31794-POND ON GORDONS FARM, T51NR12W Sec 28; **CALDWELL COUNTY:** 35887-BONANZA WILDLIFE AREA, T56NR27W Sec 32 SW4NW4; 35890-BRUSHY CREEK @ CO Hwy F, T56NR28W Sec 36;



FIGS. 95-106. Shells of Family Planorbidae FIGS. 95-97. *Gyraulus deflectus* (Say): Apertural, upper and under side views. UCM 36913. Maximum diameter (Max.) 5.7mm, Minimum diameter (Min.) 4.9mm, 4 $\frac{3}{4}$ whorls. FIGS. 98-100. *Gyraulus parvus* (Say): Apertural, upper and under side views. UCM 36898. Max. 4.2mm, Min. 3.5mm, 4 $\frac{1}{8}$ whorls. FIGS. 101-103. *Helisoma anceps* (Menke): Apertural, upper and under side views. UCM 34236. Max. 10.6mm, Min. 9 mm, Height (H.) 5.7mm, 3 $\frac{3}{4}$ whorls. FIGS. 104-106. *Helisoma subcrenatum* Carpenter: Apertural, upper and under side views. UCM 36900. Max. 22mm, Min. 18.8mm, H. 8.1mm, 4 $\frac{1}{4}$ whorls.

CALLAWAY COUNTY: 32997-DITCH @ CO Hwy C IN MOKANE, T45NR08W Sec 12 NW4; 32160-MIDDLE RIVER @ U.S Hwy 54, T46NR10W Sec 02; **CARROLL COUNTY:** 36481-BORROW PIT, T53NR23W Sec 34 SW4NE4; **CASS COUNTY:** 32293-GARDEN CITY LAKE, T44NR29W Sec 31 NW4; **CHARITON COUNTY:** 36873-ROADSIDE POOL ALONG MO Hwy 05, T54/55NR18W Sec 33; **CLARK COUNTY:** 36884-FOX VALLEY STATE FOREST, T66NR08W Sec 21; **CLAY COUNTY:** 32308-CARROLL CREEK @ MO Hwy 92, T53NR30W Sec 30; 32306-TRIBUTARY OF FISHING RIVER @ MO Hwy 33, T52NR31W Sec 15; 35858-POOLS B & D IN COOLEY LAKE WILDLIFE AREA, T51NR30W Sec 02 SE4; **COLE COUNTY:** 36004-NORTH MOREAU RIVER, T44NR14W Sec 12 SE4SE4; **COOPER COUNTY:** 35996-LAMINE RIVER WILDLIFE AREA, T46NR19W Sec 36 SW4NE4; 35999-TRIBUTARY OF MONITEAU CREEK, T46NR16W Sec 14 NW4C; **CRAWFORD COUNTY:** 33028-MERAMEC RIVER (MR), T39NR02W Sec 30 EC; 36975-(MR), @ SCOTT FORD, T37NR05W Sec 27 SE4SW4; 36980-(MR), T38NR04W Sec 18 C; **DADE COUNTY:** 36128-SANS CREEK, T30/31NR27W Sec 05 NC/32 SC; **DALLAS COUNTY:** 36066 & 36070-BENNETT SPRING IN BENNETT SPRING STATE PARK (BSBSP), T35NR17W Sec 31; 33717-(BSBSP), 36059-NIANGUA RIVER, T34NR18W Sec 02 NW4SW4; **DUNKLIN COUNTY:** 37015-DRAINAGE DITCH, T23NR09E Sec 24 SE4/25 NE4; **GASCONADE COUNTY:** 36941-BOURBEUSE RIVER, T40NR06W Sec 14 NW4SW4; 36937-MINT SPRING NATURAL AREA, T40NR06W Sec 24 SE4NE4; 36947-RED OAK CREEK @ MO Hwy 28, T42NR05W Sec 13; **GRUNDY COUNTY:** 32335-ROADSIDE POOL ALONG MO Hwy 6, T61NR24W Sec 13 SC; **HARRISON COUNTY:** 32327-POOL N OF U.S. Hwy 136, T64NR26W Sec 23 NE4; **HENRY COUNTY:** 34271-BORROW PIT ALONG MO Hwy 13, T41NR26W Sec 24 NE4; **HICKORY COUNTY:** 37066-LITTLE WEAUBLEAU CREEK @ U.S. Hwy 54/MO Hwy 83, T37NR23W Sec 32; 37061-WEAUBLEAU CREEK @ CO Hwy OO, T36NR23W Sec 20; **HOLT COUNTY:** 36685-EAGLE POOL IN SQUAW CREEK NATIONAL WILDLIFE REFUGE; 35846-HADORN BRIDGE ACCESS, T60NR35W Sec 14; 35843-ROADSIDE DITCH ALONG MO Hwy 118, T62NR39W, Sec 02 SE4; **HOWELL COUNTY:** 35974-SOUTH FORK OF SPRING RIVER, T21NR08W Sec 05 EC; **IRON COUNTY:** 34193-POND ALONG MO Hwy 32, T35NR02E Sec 33 NW4; 33797-UNNAMED FEN, T31NR01W Sec 07 SE4; **JACKSON COUNTY:** 37046-HONKER POND, T47NR31W Sec 22 NW4NW4; 37044-PLOVER LAKE IN JAMES REED MEMORIAL WILDLIFE AREA, T47NR31W Sec 15 NE4SW4; 37049-LONE JACK LAKE, T47NR30W Sec 11 SE4SW4; 37035-WATERFOWL MARSH, T47NR31W Sec 23 SE4; **JASPER COUNTY:** 29529-CENTER CREEK @ I-44 LOOP, T27NR29W Sec 29; 32145-CENTER CREEK @ U.S. Hwy 71, T28NR31W Sec 34; **JEFFERSON**

COUNTY: 36016-BIG RIVER @ MORSE MILL ACCESS, T41NR03E Surv 1972 E; 36020-DRY CREEK @ CO Hwy Y, T40NR03E Sec 14; 36012-DUTCH CREEK @ CO Hwy NN, T42NR03E Sec 22; 36009-UNNAMED CREEK, T43NR04E Surv 3059 SE4; **JOHNSON COUNTY:** 37052-HAZEL LAKE @ CO Hwy OO, T47NR26W Sec 28; 37055 & 37057-R & M PERRY MEMORIAL WILDLIFE AREA, T47NR24W Sec 03 SE4NW4; **KNOX COUNTY:** 32962-BORROW PIT JCT MO Hwys 15 & 6, T62NR11W Sec 06; **LAFAYETTE COUNTY:** 36471-R.L.D.S. LAKE, T49NR28W Sec 15/22; **LINCOLN COUNTY:** 35802 & 35837-B.K. LEACH WILDLIFE AREA, T50NR03E Surv 1693 EC; 36897-LAKE IN WHITE MEMORIAL WILDLIFE AREA, T51NR01W Surv 1686 SW4; 36930-POOL ENCLOSED BY GRAVEL ROADS, T51NR02E Sec 12 SW4; 35806-PRAIRIE SLOUGH WILDLIFE AREA, T51NR02E Surv 1676 SW4; 36933-SWAMP IN B.K. LEACH WILDLIFE AREA, T50NR03E Surv 1678 NE4; **LINN COUNTY:** 35900-ROADSIDE POOL ALONG U.S. Hwy 36, T57NR22W Sec 12 NW4; **LIVINGSTON COUNTY:** 35896-BORROW PIT, T57NR24W Sec 11 NW4; 35894-SWAMP ALONG U.S. Hwy 36, T57NR24W Sec 17 SE4SW4; **McDONALD COUNTY:** 40119-INDIAN CREEK 2 MI SW OF BOULDER CITY; **MACON COUNTY:** 40143-BORROW PIT ALONG U.S. Hwy 36, T57NR15W Sec 18 NE4; **MISSISSIPPI COUNTY:** 33750-ROADSIDE POOL ALONG MO Hwy 77, T25/26NR17E Sec 34 SW4; **MONTGOMERY COUNTY:** 36845-LAKE WHITESELL IN MARSHALL I. DIGGS WILDLIFE AREA, T50NR06W Sec 31 NW4; **NEWTON COUNTY:** 40104-INDIAN CREEK @ BOULDER CITY; 40119-INDIAN CREEK 2 MI SW OF BOULDER CITY; 40108-UNNAMED CREEK @ BOULDER CITY; **NODAWAY COUNTY:** 32315-POND E SIDE OF CEMETERY, T64NR35W Sec 20; 32319-POOL BESIDE LONG BRANCH @ U.S Hwy 13, T64NR34W Sec 23 NE4; **OREGON COUNTY:** 36024-BARRETT SPRING, T25NR03W Sec 03 SW4NW4; 40144-ELEVEN POINT RIVER (EPR), T23NR02W Sec 17 SE4NC; 34258-(EPR) @ U.S. Hwy 160, T23NR02W Sec 17; 35875-(EPR), T23NR02W Sec 20 NE4; 35880-(EPR), T23NR02W Sec 21 SE4; 35946-(EPR) T23NR02W Sec 34 SW4; 36051-(EPR), T24NR02W Sec 32 SE4; 36150 & 36952-(EPR), T25NR03W Sec 31 NW4; 36965-(EPR), T24NR02W Sec 18 C; 33731 & 33743-WARM FORK OF SPRING RIVER IN THAYER, T22NR05W Sec 32; **OZARK COUNTY:** 32125-SPRING CREEK @ CO Hwy N, T24NR13W Sec 04; **PERRY COUNTY:** 36463-RITTER CAVE, T36NR10E Surv 86; **PETTIS COUNTY:** 37025-HEATH CREEK @ U.S. Hwy 65, T48NR21W Sec 27; 37021 & 37023-UNNAMED TRIBUTARY OF HEATH CREEK @ CO Hwy J, T47NR20W Sec 18; **PIKE COUNTY:** 36926-DU PONT RESERVATION (DPR) BORROW PIT, T55NR02/03W Sec 07 NW4; 36919-(DPR), T55NR02/03W Sec 07 NW4NE4; 36928 & 40145-TED SHANKS WILDLIFE AREA POOL JUST SOUTH OF HEADQUARTERS, T55NR02W Sec 16/



Map 50: *Menetus brogniartiana*
(Lea)

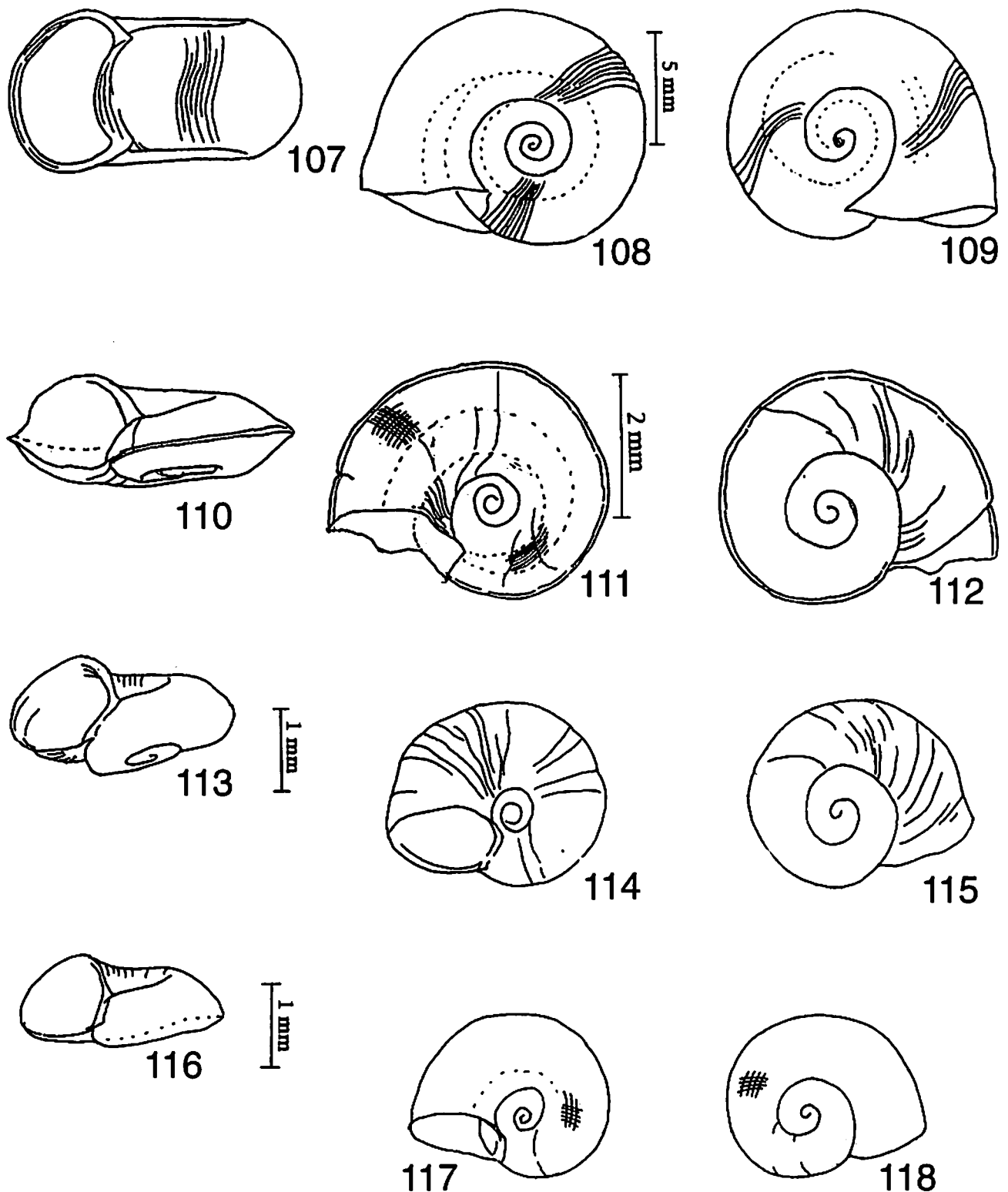
17; **PLATTE COUNTY:** 35850-LITTLE BEAN MARSH NATURAL HISTORY AREA, T54NR37W Sec 10 SC; 35852-ROADSIDE MARSH @ MO Hwy 45, T54NR37W Sec 30 C; **PULASKI COUNTY:** 36468-GASCONADE RIVER, T37NR11W Sec 34 C; **PUTNAM COUNTY:** 36876-REBEL COVE WILDLIFE AREA, T67NR16W Sec 12 WC; **RALLS COUNTY:** 36512-TRIBUTARY OF SPENCER CREEK, T54NR05W Sec 09 NE4; **RANDOLPH COUNTY:** 32992-BORROW PIT BESIDE RR, T53NR13W Sec 31 SE4; **RAY COUNTY:** 35860-BORROW PIT MO Hwy 13 & CO Hwy B, T52NR27W Sec 06; **REYNOLDS COUNTY:** 34262-BLACK RIVER IN JOHNSON SHUT-INS STATE PARK, T33NR02E Sec 16 NW4; **RIPLEY COUNTY:** 32587-BUZZARD RUN CREEK @ CO Hwy B, T23NR04E Sec 14/15; 36083-CURRENT RIVER, T22NR02E Sec 04 SE4; 35959-LITTLE BLACK RIVER IN MUD PUPPY WILDLIFE AREA, T24NR03E Sec 23 C; **ST. CHARLES COUNTY:** 34168-MARAIS TEMPS CLAIR, T48NR05E Sec 24 NC; 36137-SMALL POOL BY AHDEN KNIGHT LAKE (BWA); 36522-SMALL POOL NEAR LAKE 23 IN (BWA); **ST. LOUIS COUNTY:** 31833-CARR CREEK, T44NR03E Sec 19/24; **SALINE COUNTY:** 39505 & 36858-VAN METER STATE PARK, T52NR22W Sec 25 WC; **SCOTT COUNTY:** 33818-PRICE ISLAND, T27NR16E Sec 05 WC; **SHANNON COUNTY:** 36109-CURRENT RIVER (CR), T31NR05W Sec 28 SE4SW4; 36112-(CR), T31NR05W Sec 34

SE4; 35865-JACKS FORK RIVER, T28NR06W Sec 25 SE4NE4; 34203-ROUND SPRING, T30NR04W Sec 20 NW4; **STODDARD COUNTY:** 33722-DITCH ALONG ENTRANCE ROAD INTO MINGO NATIONAL WILDLIFE REFUGE (MNWR), T27NR09E Sec 19; 34151-POOL W OF ROCKHOUSE LAKE IN (MNWR); 35917-OTTER SLOUGH WILDLIFE AREA, T24NR09E Sec 17 SE4E; 33732-ROCKHOUSE LAKE IN (MNWR); **WARREN COUNTY:** 36488-CHARETTE CREEK, T46NR02W Sec 23 NE4; **WASHINGTON COUNTY:** 32983- PRATT SPRING, T40NR01W Sec 30 SE4NW4; **WAYNE COUNTY:** 32280-BEAR CREEK @ CO Hwy C, T29NR07E Sec 19; 35980-McKENZIE CREEK, T29NR03E Sec 27 NE4.

GENUS *MENETUS* ADAMS & ADAMS 1855

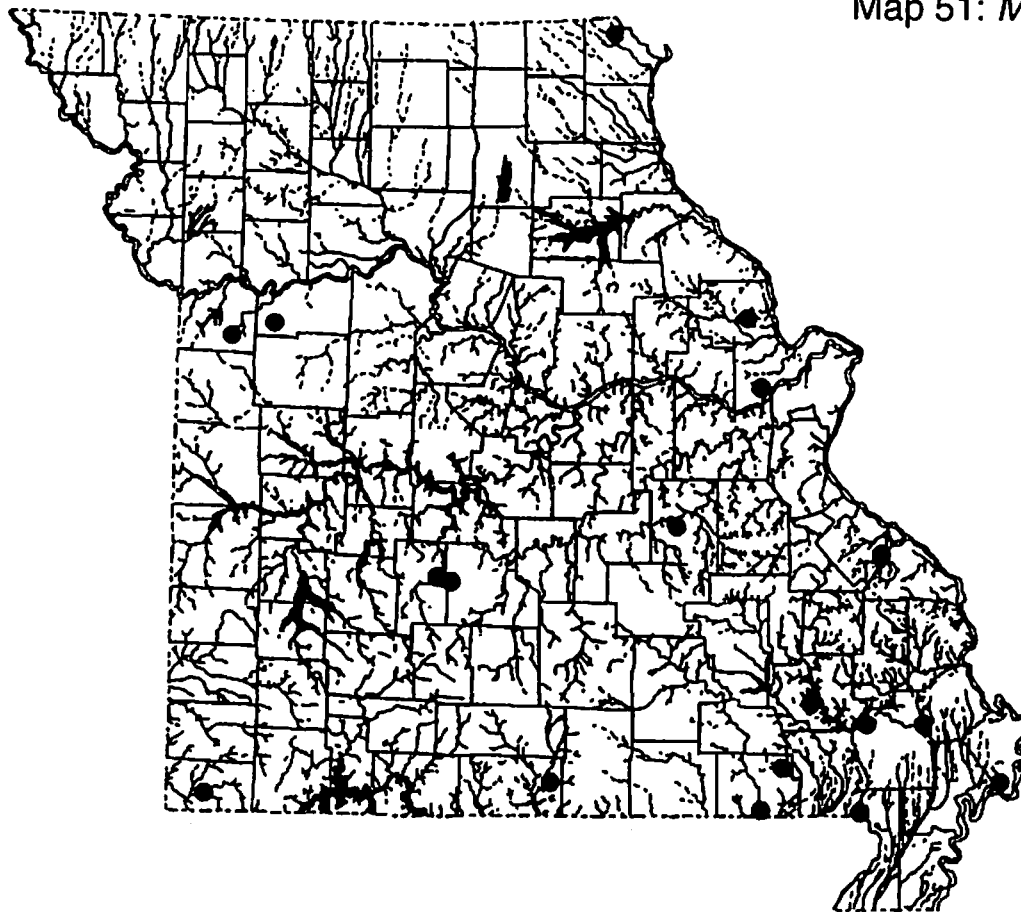
Genus characters:

Shell small, with few rapidly enlarging whorls, the body whorl of large diameter compared with the inner whorls; right side flat, left side with the spire whorls deeply immersed; periphery of shoulder of body whorl more or less carinated; aperture wide, more or less expanded; outer lip usually thin (from Baker, 1945).



FIGS. 107-118. Shells of Family Planorbidae FIGS. 107-109. *Helisoma trivolvis* (Say): Apertural, upper and under side views. UCM 35858. Max. 13.2mm, Min. 10.1mm, H. 6.5mm, 3 1/4 whorls. FIGS. 110-112. *Menetus brogniartiana* (Lea): Apertural, upper and under side views. UMMZ 176714. Max. 3.9mm, Min. 3.2mm, 3 1/4 whorls. FIGS. 113-115. *Menetus dilatatus* (Gould): Apertural, upper and under side views. UCM 36888. Max. 4.1mm, Min. 3.4mm, 3 whorls. FIGS. 116-118. *Menetus dilatatus* (Gould): Apertural, upper and under side views. UCM 38921. Max. 2.5mm, Min. 2.1mm, 2 7/8 whorls.

Map 51: *Menetus dilatatus*
(Gould)



Menetus brogniartiana (Lea 1842)

Common name: disc sprite

Figures 110-112

Diagnostic characters:

Shell small; upper (left) side deeply depressed, under (right) side flat. Aperture simple, somewhat hexagonal in shape. Periphery strongly carinated (Fig. 110).

Distribution in Missouri:

Collected only from the northeast side of Creve Coeur Lake in St. Louis County (Map 50).

Records:

ST. LOUIS COUNTY: (UMMZ) 176714-ST. LOUIS COUNTY.

Remarks:

Lea (1842) reported this species from a location near Cincinnati, Ohio, and Pilsbry (1895) reported it from Woodville, Alabama as *alamabensis*. Figures 110-112 were drawn from a specimen collected by Leslie Hubricht on 21 November 1941.

Menetus dilatatus (Gould 1841)

Common name: bugle sprite

Figures 113-118

Diagnostic characters:

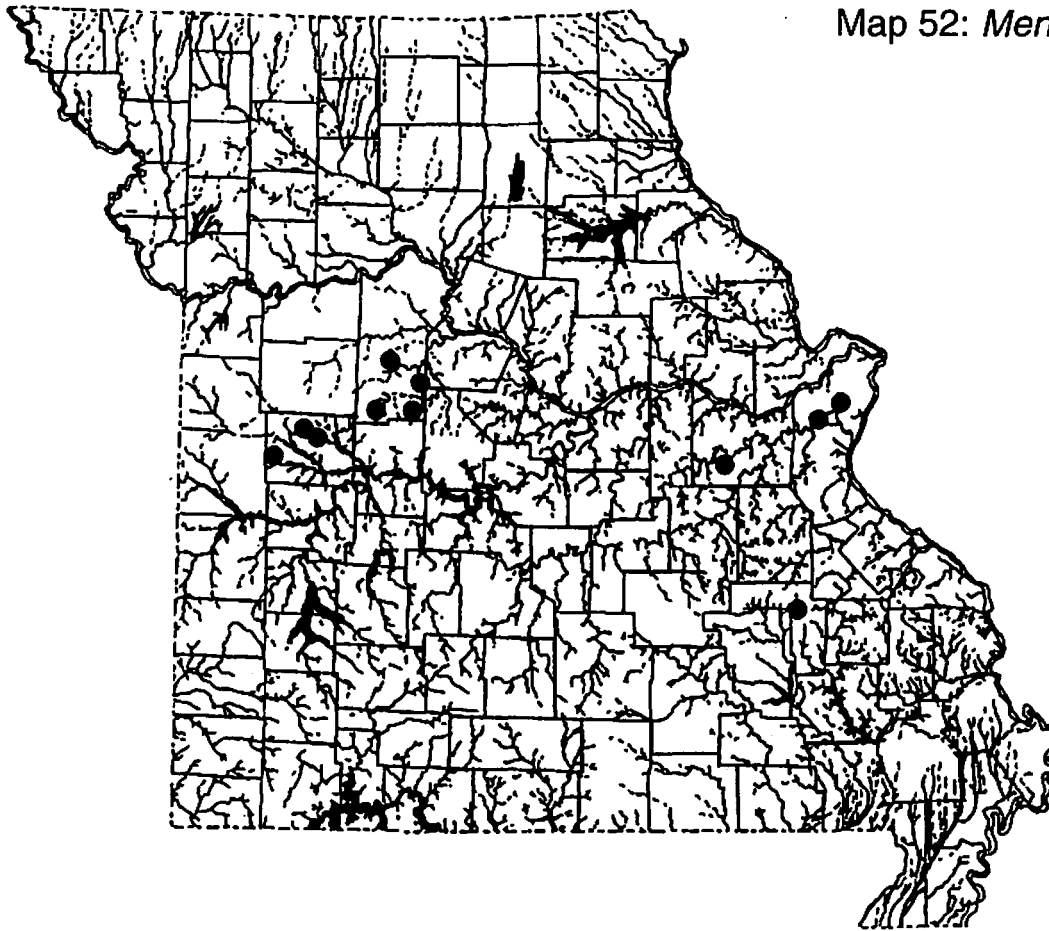
Shell small, dark brown. Upper side deeply depressed, under side convexed with a narrow umbilicus. Aperture simple, reversed subtriangular shape. Periphery of body whorl subcarinated or carinated below.

Distribution in Missouri:

Distributed in the Ozarks, the southeast Lowland Regions and the Mississippi River Region of the Prairie Region (Map 51).

Records:

CLARK COUNTY: 36886-LAKE IN FOX VALLEY STATE FOREST, T66NR08W Sec 21; **CRAWFORD COUNTY:** 38987-MERAMEC RIVER, T38NR04W Sec 29 NE4; **DALLAS COUNTY:** 36072-BENNETT SPRING IN BENNETT SPRING STATE PARK T35NR17W Sec 31 SW4; 36062-NIANGUA RIVER, T34NR18W Sec 25 SW4; **DUNKLIN COUNTY:** 36994-ST. FRANCIS RIVER (OLD CHANNEL), T22NR08E Sec 29 NE4; 36996-WILHELMINA



Map 52: *Menetus sampsoni*
"Ancey" Sampson

STATE FOREST @ CO Hwy DD, T22NR08E Sec 27/34; JACKSON COUNTY: 37038-JAMES REED MEMORIAL WILDLIFE AREA, T47NR31W Sec 23 NE4; 37047-HONKER POND, T47NR31W Sec 22 NW4; LAFAYETTE COUNTY: 36472-R.L.D.S. LAKE, T49NR28W Sec 15/22; LINCOLN COUNTY: 36891-PICKLEWEED POND IN CUIVRE RIVER STATE PARK, T49NR01E Sec 05 NC; McDONALD COUNTY: 36116-ELK RIVER @ CO Hwy H, T21NR32W Sec 08; NEW MADRID COUNTY: 37005-RANSBURGH HOLE, T23NR14E Sec 36 NE4; OZARK COUNTY: 37679-NORTH FORK OF THE WHITE RIVER @ CO Hwy H, T23NR12W Sec 30; PERRY COUNTY: 40157-KNOB SCHOOL SPRING CAVE, T36NR10E Sec 14; RIPLEY COUNTY: 36091-CURRENT RIVER, T22NR02E Sec 36 SE4NW4; 35960-LITTLE BLACK RIVER IN MUD PUPPY WILDLIFE AREA, T24NR03E Sec 23 C; ST. CHARLES COUNTY: 36138-HAMPTON MEMORIAL LAKE IN BUSCH WILDLIFE AREA; 38986-POOL ALONG U.S. Hwys 40/61, T46NR02E Surv 1641 W2; STE. GENEVIEVE COUNTY: 37344 & 37686-SALTPETER CAVE, T36NR08E Sec 24; STODDARD COUNTY: 34158-MINGO RIVER IN MINGO NATIONAL WILDLIFE REFUGE; 36987-POPLAR CREEK @ CO Hwy AB, T26NR11E Sec 03; 36991-WILLIAMS CREEK @ CO Hwy AB, T26NR11E Sec 11; WAYNE COUNTY: 35933-HOLLIDAY CREEK @ CO Hwy D, T28NR05E Sec 12.

Menetus sampsoni "Ancey" Sampson 1885

Common name: Sampson sprite

Figures 119-121

Diagnostic characters:

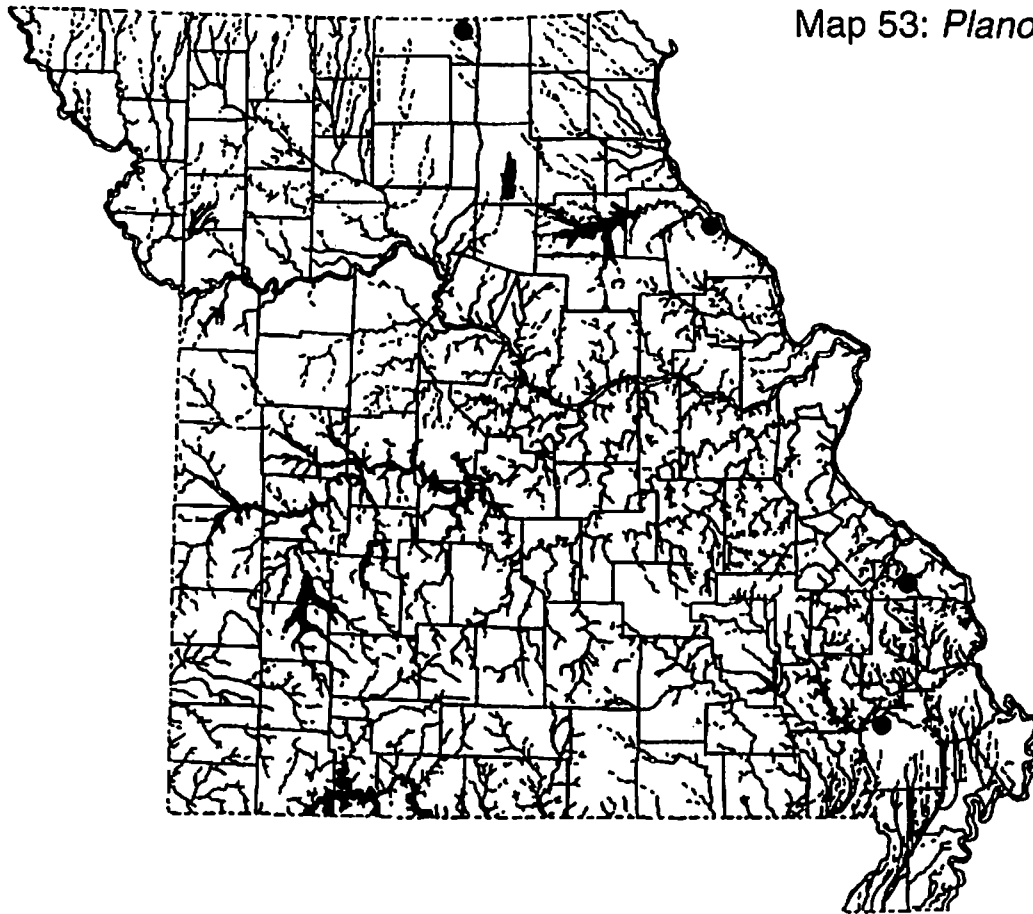
Shell small, about 4.4mm in maximum diameter, upper side depressed and under side nearly flat. Aperture simple, nearly round. Surface with spiral striations. (Fig. 119).

Distribution in Missouri:

Occurs only in the Ozark Region (Map 52).

Records:

FRANKLIN COUNTY: (UMMZ) 176720-FRANKLIN COUNTY; HENRY COUNTY: (UMMZ) 28536, 89752 & 89753-HENRY COUNTY; HOWELL COUNTY: (UMMZ) 31813 & 89760-HOWELL COUNTY; IRON COUNTY: (UMMZ) 176722-IRON COUNTY; PETTIS COUNTY: (UMMZ) 28347, 89751, 89761 & 143441-PETTIS COUNTY; ST. LOUIS COUNTY: (UMMZ) 55961, 176719 & 176724-ST. LOUIS COUNTY; (COUNTY NOT RECORDED) (UMMZ) 89754-BOWONER SPRING.



Map 53: *Planorbula arxmigera*
(Say)

GENUS *PLANORBULA* HALDEMAN 1840

Genus characters:

Shell small, of few closely coiled whorls, slowly increasing in diameter, with flatly rounded whorls above and a wide depression below, the body whorl usually carinate in the middle; lip more or less thickened by a varix (from Baker, 1945).

Planorbula armigera (Say 1821)

Common name: thicklip rams-horn

Figures 122-124

Diagnostic characters:

Shell small (diameter 7.4mm) light brown. Upper side moderately depressed, weakly carinated; underside a little depressed and flat. Whorls 5, periphery round, umbilicus wide, deep. Aperture simple and sublunar shape.

Distribution in Missouri:

Occurs in the Chariton River area in Putnam County, southeast Lowland Region and counties near

the Mississippi River (Map 53).

Records:

PERRY COUNTY: 36462-RITTER CAVE, T36NR10E Surv 86;
PIKE COUNTY: 36906-CLOSED CANOPY SWAMP IN TED SHANKS WILDLIFE AREA (TSWA), T55NR02W Sec 27 NE4; 38985-(TSWA), T55NR02W Sec 22 C; **PUTNAM COUNTY:** 36878-REBEL COVE WILDLIFE AREA, T67NR16W Sec 33 NW4; **STODDARD COUNTY:** 35005-BLUFF POOL BETWEEN FLATBANKS & MUSEUM IN MINGO NATIONAL WILDLIFE REFUGE.

FAMILY ANCYLIDAE RAFINESQUE 1815

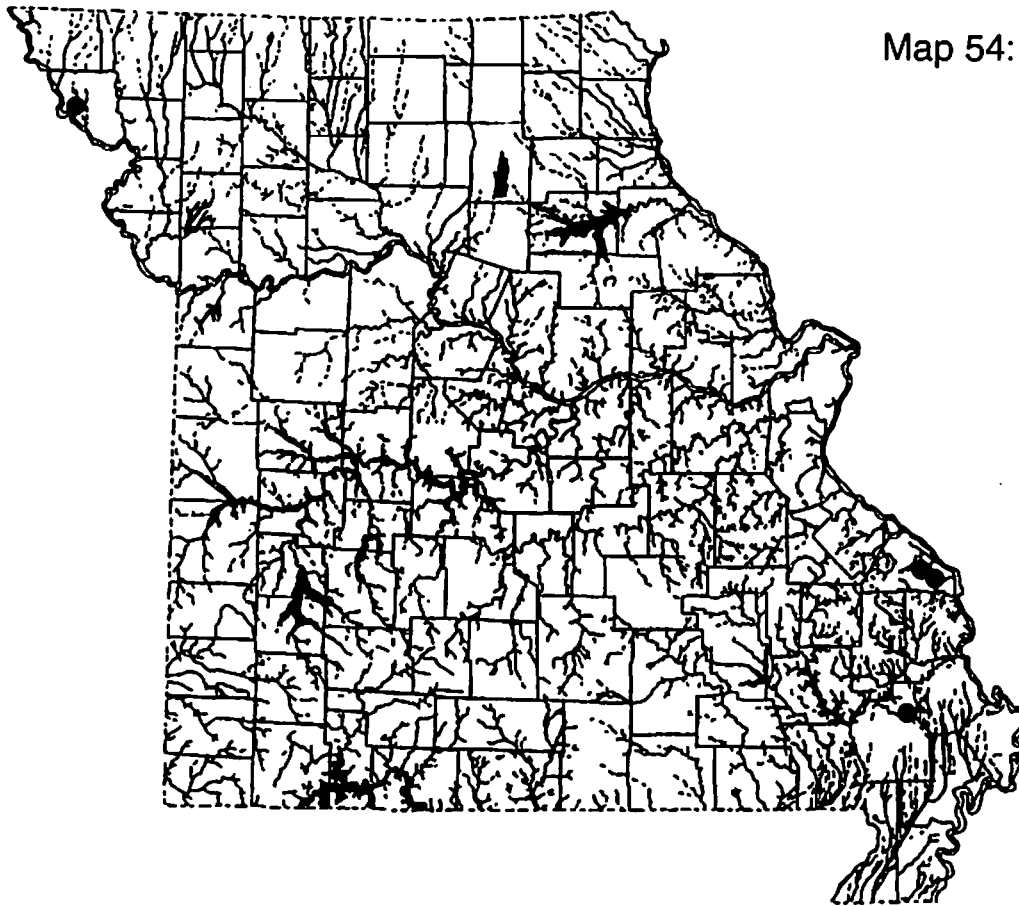
Family characters:

Shell limpet form, broadly ovate to elliptical; apex middle or posterior, and inclined to the right side.

GENUS *FERRISSIA* WALKER 1903

Genus characters:

Shell usually elevated, but variable; apex with fine



Map 54: *Ferrissia fragilis*
(Tryon)

radial striae; peritreme narrow to broadly ovate; aperture entirely open or with a horizontal shelf-like septum closing the posterior part (Basch, 1963).

Ferrissia fragilis (Tryon 1863)

Common name: fragile ancyliid

Figures 125-130

Diagnostic characters:

Shell thin and fragile, elliptical, minute, rarely exceeding 3.5mm in length and 2mm in width. Apex elevated, curved backward, posterior, and inclined to the right. Anterior slope gently convex and posterior slope short and concave (Figs. 127-128). The septate form has the apex at the posterior-most position and the posterior slope is vertical (Figs. 129-130).

Distribution in Missouri:

Occurs in Holt County near the Missouri River and in Perry County near the Mississippi River. The septate form was collected only from Stoddard County in the Lowland Region (Map 54).

Records:

HOLT COUNTY: (Regular form) 36688-BETWEEN EAGLE & PELICAN POOLS IN SQUAW CREEK NATIONAL WILDLIFE REFUGE; **PERRY COUNTY:** 32804-INDIAN CREEK CAVERNS SPRING, T34NR12E Sec 17; 38615-MYSTERY CAVE, T34NR11E Sec 09; **STODDARD COUNTY:** (Septate Form) 36988 POPLAR CREEK @ CO Hwy AB, T26NR11E Sec 03.

Remarks:

The status of the septate ancyliids was discussed by Basch (1959). He concluded that there was no reasonable basis for placing the North American septate forms into a separate genus *Gundlachia* (Basch, 1963).

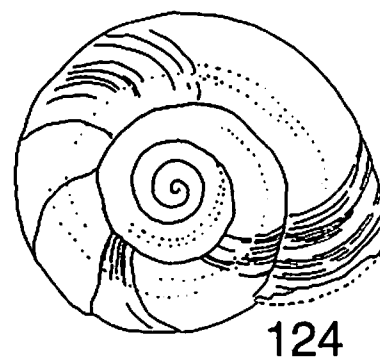
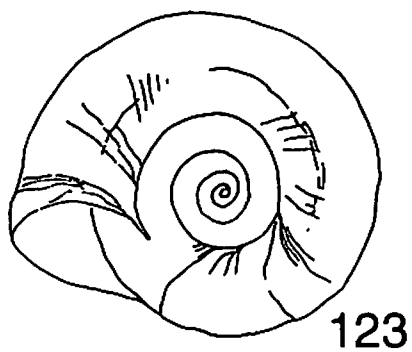
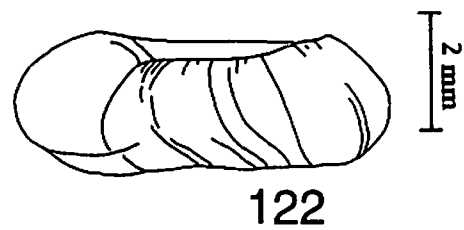
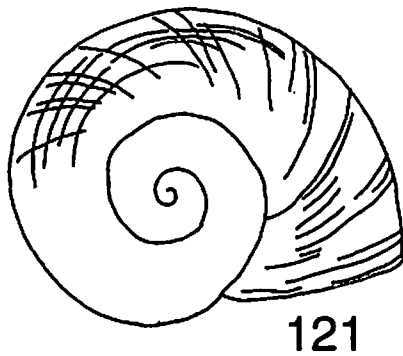
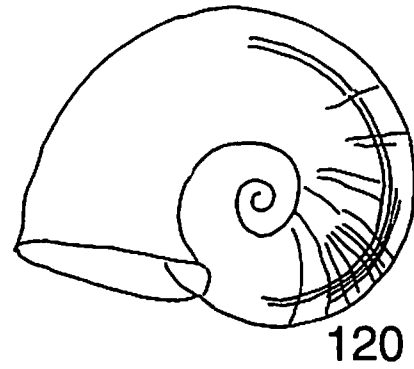
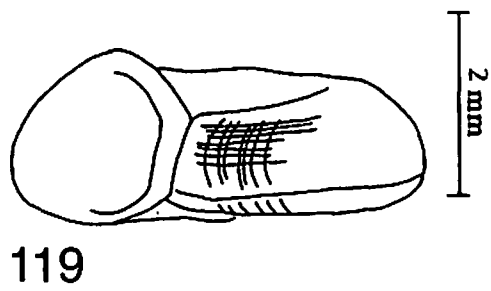
Ferrissia rivularis (Say 1817a)

Common name: creeping ancyliid

Figures 131-132

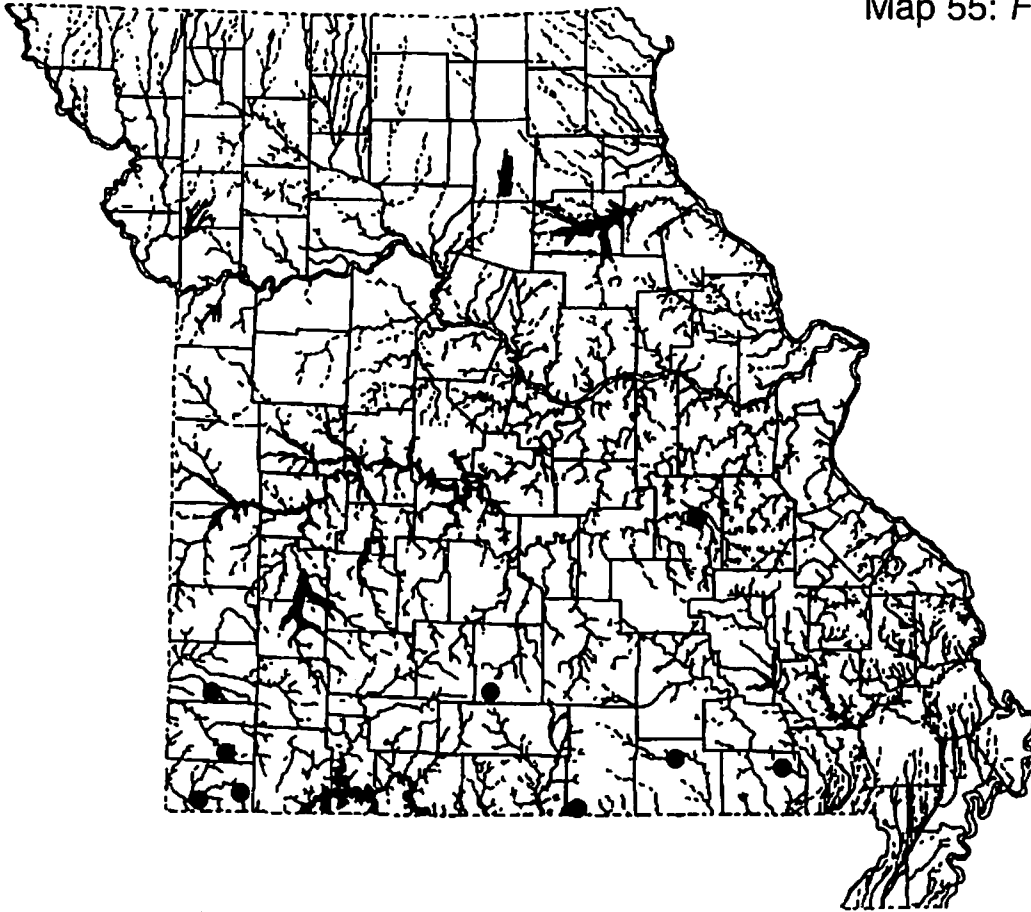
Diagnostic characters:

Shell robust elliptical, small, up to 5.4mm in length and 4mm in width. Apex in middle or slightly to the right (Fig. 131); anterior slope convex, posterior slope gently concave (Fig. 132).



FIGS. 119-124. Shells of Family Planorbidae FIGS. 119-121. *Menetus sampsoni* "Ancey" Sampson: Apertural, upper and under side views. UMMZ 89751. Max. 4.4mm, Min. 3.6mm, 3 3/4 whorls. FIGS. 122-124. *Planorbula armigera* (Say). Apertural, upper and under side views. UCM 33005. Max. 6.8mm, Min. 6mm, 5 whorls.

Map 55: *Ferrissia rivularis*
(Say)



Distribution in Missouri:

Only from the Ozark Region (Map 55).

Records:

CRAWFORD COUNTY: 34148-HUZZAH CREEK, T38NR03W Sec 23; **HOWELL COUNTY:** 37118-BENNETT RIVER @ MO Hwy 142, T21NR10W Sec 02; **JASPER COUNTY:** 29540-CENTER CREEK, @ CO Hwy HH, T28NR32W Sec 13/24; **MCDONALD COUNTY:** 29516-BIG SUGAR CREEK @ CO Hwy E, T22NR30W Sec 21; 36115-ELK RIVER @ MO Hwy 59, T21NR32W Sec 08; 40091-ELK RIVER @ MT. SHIRA ACCESS; 40099-ELKHORN CREEK 1.5 MI S OF McNATT; 40121-INDIAN CREEK (IC) 2.5 MI NE OF ANDERSON; 40123-(IC) @ MO Hwy 76; 40095 & 40131-LITTLE SUGAR CREEK (LSC) @ CAVERNA; 40112-(LSC) 1.5 MI E OF JANE; **NEWTON COUNTY:** 40105-(IC) @ BOULDER CITY; 40118-(IC) 2 MI SW OF BOULDER CITY; **OREGON COUNTY:** 33024-DEADMAN'S CAVE STREAM, T25NR04W Sec 27 NW4; **RIPLEY COUNTY:** 35961-LITTLE BLACK RIVER IN MUD PUPPY WILDLIFE AREA, T24NR03E Sec 23 C; **WRIGHT COUNTY:** 35992-BAKER CREEK, T29NR16W Sec 36 N2NC.

Genus *Laevapex* Walker 1903

Genus characters:

Shell usually depressed; apex smooth with no trace of radial striae; peritreme ovate to subcircular; aperture always open (Basch, 1963).

***Laevapex fuscus* (Adams 1841)**

Common name: dusky ancylid

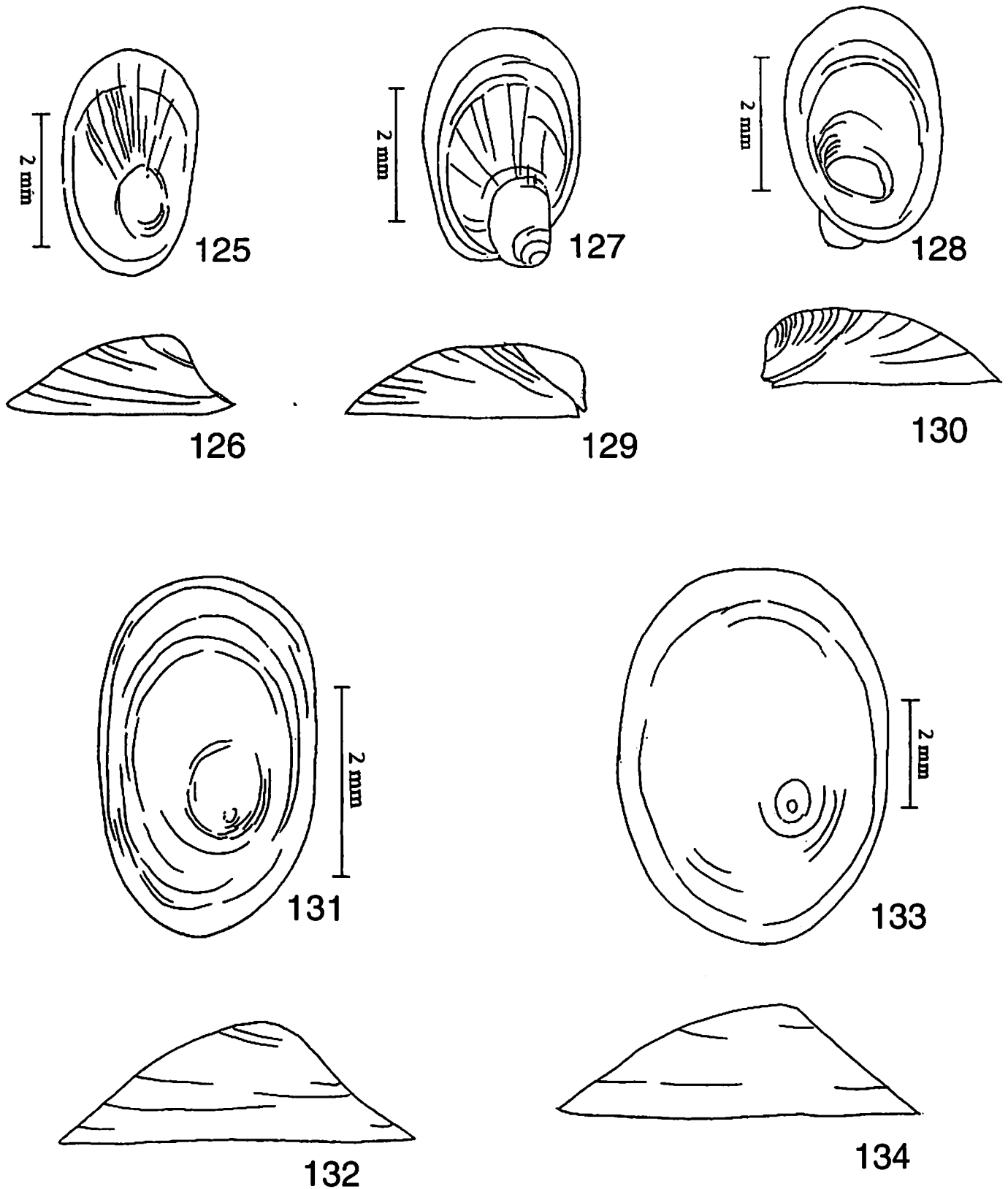
Figures 133-134

Diagnostic characters:

Shell thin, transparent, broadly ovate, brown to dark brown color. Apex obtuse, scarcely behind the middle and inclined to the right (Fig. 133). Anterior slope convex and posterior slope straight (Fig. 134). The largest specimens measured 7.1 mm in length and 5 mm in width.

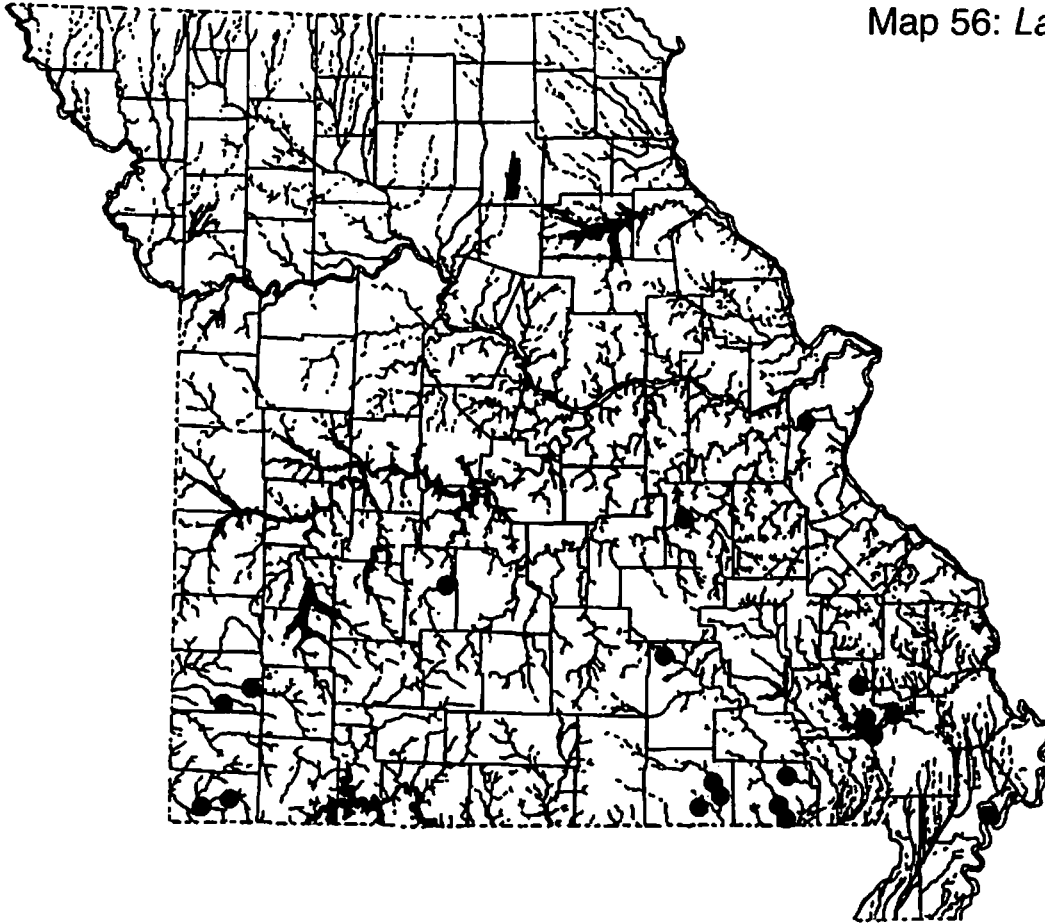
Distribution in Missouri:

Occurs in the Ozarks and Lowland Regions (Map 56).



FIGS. 125-134. Shells of Family Ancylidae. FIGS. 125-126. *Ferrissia fragilis* (Tryon): Regular form. Dorsal and left-side views. UCM 32804. FIGS. 127-130. *Ferrissia fragilis* (Tryon): Septate form. Dorsal, interior, left & right-side views. UCM 36988. FIGS. 131-132. *Ferrissia rivularis* (Say): Dorsal and left side-views. UCM 29540. FIGS. 133-134. *Laevapex fuscus* (Adams): Dorsal and left-side views. UCM 37000.

Map 56: *Laevapex fuscus*
(Adams)



Records:

CRAWFORD COUNTY: 37107-MERAMEC RIVER, T38NR04W Sec 29 NE4; **DALLAS COUNTY:** 36063-NIANGUA RIVER, T35NR18W Sec 25; **JASPER COUNTY:** 29536-CENTER CREEK @ U.S. ALT 71, T28NR31W Sec 33/34; 29549-SPRING RIVER @ MO Hwy 37, T28NR30W Sec 12; **LACLEDE COUNTY:** 36060-BENNETT SPRING BRANCH IN BENNETT SPRING STATE PARK, T34NR18W Sec 02 SW4; **MCDONALD COUNTY:** 29520-BIG SUGAR CREEK, T22NR32W Sec 25; 36117-ELK RIVER (ER) @ CO Hwy H, T21NR32W Sec 08; 40087-(ER) @ GINGER BLUE; 40092-(ER) @ MT. SHIRA ACCESS; 35983-(ER) @ MT. SHIRA ACCESS, T21NR33W Sec 1/2; **NEW MADRID COUNTY:** 37000-STUMP HOLE, T23NR15E Sec 35 NE4; 37006-FANSBURGH HOLE, T23NR14E Sec 36 NE4; **OREGON COUNTY:** 35947-ELEVEN POINT RIVER (EPR), T23NR02W Sec 34 SW4; 36057-(EPR) @ U.S. Hwy 160, T23NR02W Sec 17; 37113-FREDERICK CREEK @ CO Hwy Y, T22NR03W Sec 12; **RIPLEY COUNTY:** 36084-CURRENT RIVER (CR), T22NR02E Sec 04 SE4; 36092-(CR), T22NR02E Sec 36 SE4; 36095-(CR), T21NR02E Sec 01 NC; 35963-BARTON BRANCH, T24NR02E Sec 12 NW4; **ST. LOUIS COUNTY:** 32565-MERAMEC RIVER, T44NR03E Sec 25 E2; **SHANNON COUNTY:** 36110-(CR), T31NR05W Sec 28 SE4;

STODDARD COUNTY: 34159-MINGO RIVER IN MINGO NATIONAL WILDLIFE REFUGE, **WAYNE COUNTY:** 34227-LOST CREEK, T27NR07E Sec 03 WC; 34229-BEAR CREEK @ CO Hwy C, T29NR07E Sec 19 EC; 35924-STANLEY CREEK @ CO Hwy Z, T27NR08E Sec 18.

REGIONAL PHYSIOGRAPHY AND BIOGEOGRAPHY

MISSOURI IS A PHYSIOGRAPHICALLY DIVERSE STATE.

Two big river channel systems and three basic landscape types are represented with subdivisions within each type. Prairies are characteristic of the region basically north of the Missouri River and west of the Ozark Plateaus. The northern half of the state was glaciated during the Pleistocene. The resultant scouring of the landscape and deposition of glacial till left the region essentially flat with rolling hills in some areas from relict moraines and subsequent erosion of the topography by rivers. The region west of the Ozarks is characterized by the Osage Plains. This physiography primarily developed from weathering of horizontally deposited strata of dolomite and limestone in its southern section and shales, sandstone and thin-bedded limestone in the north. Its topography is typically low rolling hills. Rivers in these regions tend to be low gradient streams with substrates composed of silt, sand and gravel.

THE OZARK PLATEAUS IS A HIGHLAND REGION that occupies most of the southern half of the state. It represents an uplifted dome composed of four highlands, three of which occur in Missouri: St. Francis Mountains, Salem Plateau and Springfield Plateau (the Boston Mountains represents the southern boundary of the region in Arkansas). The oldest, highest, and most rugged highland in Missouri is the St. Francis Mountains. Radiating from these "mountains," are strata of progressively later geologic deposition. Streams are relatively high gradient (some headwater tributaries may exceed 10 feet per mile) with substrates of gravel, cobble and exposed bedrock. Some of these drainages may receive considerable amounts of water from large springs, both epigeal and cave, which are common throughout the region and result in their temperatures being considerably cooler during the summer and warmer during the winter than adjacent surface run-off systems. A fairly high degree of endemism has developed within the fauna of the Ozarks, including several species of snails.

A flat lowland has developed in extreme southeastern Missouri, including the bootheel region and some contiguous areas. This represents the northernmost limit of a depression that allowed the Cretaceous-Tertiary embayment of the Gulf of Mexico. It subsequently has filled with alluvial deposits from the Mississippi and Ohio

Rivers and now is the northern terminus of the Mississippi Delta Region. Crowley's Ridge is the most prominent physiographic feature of this region. With elevation of up to 300 feet higher than the local relief, it is composed of some Cretaceous strata and deep loess beds deposited during the Pleistocene and Holocene in relation to former channels of the Mississippi and Ohio rivers. This ridge represents a biological refugium, supporting plants and animals not typically encountered in these lowlands. With exception of Crowley's Ridge, where streams are higher gradient and more likely to have gravelly substrates, regional drainage systems are sluggish, turbid, usually with silt or sand substrate, and typically channelized.

The Mississippi River represents the eastern boundary of Missouri. The Missouri River forms the northwestern boundary and bisects the state between Kansas City and St. Louis. Although crossing other physiographic regions, these big river systems are entities of their own. Within their flood plains, the indigenous lithology has been eroded and replaced with alluvial deposits of upstream origin. Secondary aquatic habitats are associated with the flood plain: scour pools, side channels, marshes and oxbow lakes. Both rivers tend to be wide, relatively deep, and have rapid currents and unconsolidated substrates of gravel, sand, silt and clay.

BASED ON THESE PHYSIOGRAPHIC REGIONS, DRAINAGE systems within these regions, and localized aquatic habitats, Pflieger (1989) classified Missouri into 18 aquatic community types (see map page 82; refer to Pflieger [1989] for more detailed description of the individual types). The distribution of aquatic snails according to these categories has been summarized in Table 1. Snails were identified from all but two of these areas (Big River—Lower Mississippi River and Prairie—Neosho: Table 1, columns 4 and 18 respectively). Pulmonates dominated the prairie and lowland regions. Prosobranch snails were most prevalent in the Ozarks, including all species endemic to the state. Some gaps are apparent in the distributions of several species, both within Missouri and in relation to distributions in other states. Most of these probably are due to alteration of habitat (e.g., channelization, reservoir construction).

OF AQUATIC SNAILS IN MISSOURI

Fig. 135

The Aquatic Faunal Regions and Divisions of Missouri (From Pflieger, 1989; used with permission of Missouri Department of Conservation.)

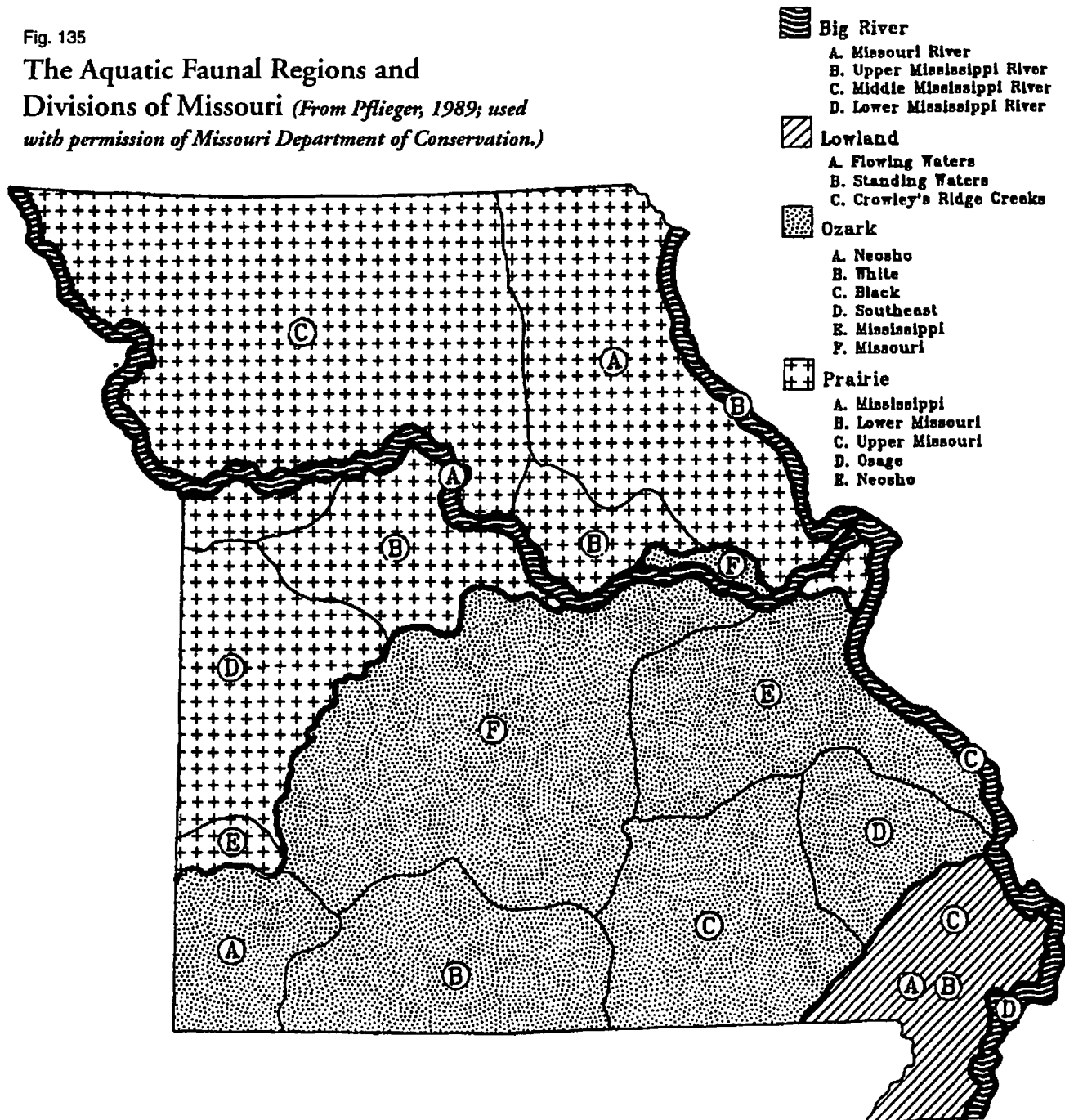


Table 1. Synopsis of distribution of Missouri freshwater snails by aquatic community system as defined by Pflieger (1989).

SPECIES	AQUATIC COMMUNITY TYPE																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Campeloma missouriensis</i> Gordon		■													■			
<i>Campeloma subsolidum</i> (Anthony)							■	■	■	■	■	■						
<i>Lioplax sulculosa</i> (Menke)													■					
<i>Viviparus georgianus</i> (Lea)									■									
<i>Viviparus intertextus</i> (Say)		■			■				■			■						
<i>Viviparus subpurpureus</i> (Say)		■		■	■							■						
<i>Amnicola limosa</i> (Say)	■													■		■		
<i>Amnicola stygia</i> Hubricht												■						
<i>Antrobia culveri</i> Hubricht								■										
<i>Birgella subglobosa</i> (Say)			■										■	■				
<i>Cincinnatia integra</i> (Say)	■						■		■	■	■	■	■	■	■		■	
<i>Fontigens aldrichi</i> (Call & Beecher)									■			■	■	■				
<i>Fontigens antroecetes</i> (Hubricht)												■						
<i>Fontigens proserpina</i> (Hubricht)												■						
<i>Probythinella emarginata</i> (Küster)													■	■				
<i>Pyrgulopsis ozarkensis</i> Hinkley									■									
<i>Pyrgulopsis scalariformis</i> (Wolf)												■						
<i>Somatogyrus depressus</i> (Tryon)													■					
<i>Somatogyrus rosewateri</i> Gordon							■											
<i>Pomatiopsis lapidaria</i> (Say)		■		■					■	■	■	■	■	■	■	■	■	
<i>Elimia potosiensis</i> (Lea)							■	■	■	■	■	■	■					
<i>Leptoxis arkansensis</i> (Hinkley)									■									
<i>Pleurocera acuta</i> Rafinesque	■		■		■	■	■	■	■	■	■	■	■	■				
<i>Pleurocera alveare</i> (Conrad)									■									
<i>Lymnaea (Fossaria) bulimoides</i> Lea															■	■		
<i>Lymnaea (Fossaria) humilis</i> Say	■						■		■	■	■	■	■					
<i>Lymnaea (Fossaria) modicella</i> Say	■								■	■	■	■		■				
<i>Lymnaea (Fossaria) obrussa</i> Say	■			■	■				■	■	■	■						
<i>Lymnaea (Fossaria) parva</i> Lea									■	■	■	■	■	■	■			
<i>Lymnaea (Stagnicola) caperata</i> Say		■			■									■	■	■		
<i>Lymnaea (Stagnicola) elodes</i> Say			■		■									■	■			
<i>Pseudosuccinea columella</i> (Say)		■			■	■	■	■		■	■		■	■	■	■	■	
<i>Physa (Physella) elliptica</i> Lea					■								■					
<i>Physa (Physella) goodrichi</i> Clench				■					■			■	■	■				
<i>Physa (Physella) gyrina</i> Say	■	■			■			■	■	■	■	■	■	■	■	■	■	■
<i>Physa (Physella) heterostropha</i> (Say)		■						■	■	■		■	■	■	■			
<i>Physa (Physella) saffordii</i> Lea														■		■		
<i>Physa (Physella) salina</i> Clench																■		
<i>Physa (Physodon) acuta</i> Draparnaud	■				■					■		■	■			■		
<i>Physa (Physodon) anatina</i> Lea		■	■		■	■				■	■	■	■	■	■	■	■	■
<i>Physa (Physodon) halei</i> Lea	■	■			■	■		■	■	■	■	■	■	■	■	■	■	■

SPECIES

AQUATIC COMMUNITY TYPE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<i>Physa (Physodon) hendersoni</i> (Clench)												■						
<i>Physa (Physodon) peninsularis</i> (Pilsbry)						■								■		■		
<i>Physa (Physodon) pomilia</i> Conrad		■			■	■		■	■	■	■	■	■	■	■	■	■	■
<i>Gyraulus deflectus</i> (Say)	■	■								■	■	■	■	■	■	■	■	■
<i>Gyraulus parvus</i> (Say)	■				■	■				■	■	■	■	■	■	■	■	■
<i>Helisoma anceps</i> (Menke)										■	■	■						
<i>Helisoma subcrenatum</i> (Carpenter)	■									■		■	■	■	■	■	■	■
<i>Helisoma trivolvis</i> (Say)	■	■	■		■		■	■	■	■	■	■	■	■	■	■	■	■
<i>Menetus brogniartiana</i> (Lea)	■																	
<i>Menetus dilatatus</i> (Gould)					■	■	■	■	■	■	■	■	■	■		■		
<i>Menetus sampsoni</i> "Ancey" in Sampson										■		■		■	■		■	
<i>Planorbula armigera</i> (Say)		■				■										■		
<i>Ferrissia fragilis</i> (Tryon)	■						■					■						
<i>Ferrissia rivularis</i> (Say)								■	■	■		■	■					
<i>Laevapex fuscus</i> (Adams)						■		■		■	■	■	■	■				

Aquatic community types:

1. Missouri River
2. Upper Mississippi River
3. Middle Mississippi River
4. Lower Mississippi River
5. Lowland Flowing Waters
6. Lowland Standing Waters
7. Crowley's Ridge Creeks
8. Ozark Neosho
9. Ozark White
10. Ozark Black
11. Ozark Southeast
12. Ozark Mississippi
13. Ozark Missouri
14. Prairie Mississippi
15. Prairie Lower Missouri
16. Prairie Upper Missouri
17. Prairie Osage Plains
18. Prairie Neosho

GLOSSARY

Adnate. Joined together.

Adapical. Toward shell apex.

Allotype. A designated paratype of the sex opposite to that of the holotype.

Amphibious. Species which may be found in or out of water, but are restricted to aquatic habitats.

Aperture. The opening at last-formed margin or the "mouth" of a snail shell providing an outlet for the head/foot mass.

Callus. A thickened layer of calcareous material on parietal portions of the inner lip of a shell.

Cancellate. Having ornament of intersecting spiral and transverse lines or ridges.

Carina. A prominent spiral ridge or keel.

Collabral. Conforming to shape of outer lip, as shown by growth lines.

Columella. The axis of a spiral shell around which the whorls revolve.

Concentric. Having the same center, e.g., the nucleus, and expanding outward in parallel lines, as in the lines of growth of an operculum.

Corneous. Horn-like.

Costa. Regularly spaced, heavy transverse ridge or rib on whorl surface.

Dextral. Right-handed.

Dimorphic. Having two forms, usually referring to morphological variation between sexes, i.e., sexually dimorphic.

Endemic. Geographically restricted to a certain region.

Epigean. Occurring above or on the ground surface.

Extirpated. Localized extinction of populations within a portion of a species geographic range.

Fusiform. Slender spindle shaped, tapering almost equally toward both ends.

Genitalia. Reproductive structures.

Gonochoristic. Having the sexes separate in male and female individuals.

Gyrate. Having convolutions, coiled.

Hermaphroditic. Organisms simultaneously possessing male and female sex organs.

Holotype. A single designated specimen on which a species is based.

Hyperstrophic. Dextral anatomically with genitalia on right, but shell is falsely sinistral.

Imperforate. Umbilicus of a gastropod shell is closed.

Lacrimate. Tear shaped.

Lirate. Ornamented with fine linear elevations.

Lot. One or more specimens of a species collected from the same locality on the same day, and assigned one museum catalogue number.

Malleate. Dented as if hit repeatedly by a hammer.

Operculate. Snails that possess an operculum.

Operculum. A corneous or calcareous plate borne on the dorsal posterior foot of prosobranch snails which closes the aperture when the snail withdraws into its shell.

Orthocline. At right angles to the direction of growth of the body whorl.

Paratype. A supplemental specimen(s), in addition to the holotype, used in the original description of a species.

Parietal Region. Basal surface of body whorl adjacent to or adnate with apical region of aperture.	Punctate. Having a surface covered with small holes or dots.
Parthenogenesis. Reproduction by the development of an unfertilized ovum.	Pupiform. Pupa shaped.
Paucispiral. Refers to an operculum in which there are a few rapidly enlarging coils or whorls.	Radula. A ribbon-like, toothed structure in the anterior end of the digestive tract of mollusks, except bivalves.
Penultimate. Next to the last-formed, commonly referring to whorl preceding the body whorl.	Rimate. Consisting of a very narrow crevice, referring commonly to an umbilicus.
Periostracal hairs. Hair-like structures protruding from the periostracum.	Sarcovelum. Verge or verge papilla through which penis exits to the outside or into the preputial lumen.
Periostracum. The thin proteinaceous outermost shell layer.	Sculpture. Relief pattern on shell surface, ornamentation.
Periphery. Part of shell or any particular whorl farthest from axis.	Septum. A partition separating two cavities.
Peristome. Margin of aperture.	Sinistral. Left-handed.
Peritreme. Margin of a shell opening.	Sinuuous. S-shaped undulations.
Phenotype. Appearance of an individual as a result of the interaction between genotype and environment.	Spire. The whorls of a snail shell, excepting the last or body whorl.
Plait. A flattened fold.	Striae. Very narrow incised shallow grooves; also commonly used to refer to thread-like ridges.
Planorbid. Referring to a member of the family Planorbidae.	Subhyaline. Semi-transparent.
Planorbidiform. Shaped like the spirally-depressed shells of the Planorbidae.	Succiniform. <i>Succinea</i> -like.
Preputium. A distal pocket of male terminal structure which houses ridges and sarcovelum. In Physidae and Planorbidae, it also contains preputial gland.	Sympatric. Referring to organisms with overlapping geographic distributions.
Prosobranch. Snails having gills in front of the heart and sexes separate.	Trochoid. Conical shells with flattened sides and subacute spires similar in shape to marine shells in the Genus <i>Trochus</i> .
Protoconch. The larval shell of a mollusk.	Troglodyte. Species evolved and restricted to cave environments.
Pulmonate. Snails having lungs or organs that act as lungs.	Turbinate. Shaped like a turban, shell with broadly conical spire and convex base.

Turreted. Shells possessing high conical spires and shouldered whorls with flattened tops.

Umbilicus. An opening or cavity at the base of a shell formed when the inner sides of the coiled whorls do not join.

Varix. Longitudinal thickened elevation or ridge on shell surface representing a former position of aperture lip at a period of arrested growth.

Verge. Organ in male genital tract of some snails that bears the penis.

Whorl. One complete turn or coil of a spiral gastropod shell.

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